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OAK RIDGE NATIONAL LABORATORY

CENTRAL FILES NUMBER

48-9-254

-1-

Date September 27, 1948

File

Subject First Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

Those Eligible to Read the attached

Copy # 14

To C. N. Rucker

From Stuart McLain

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Per Letter Instructions Of

[redacted]

Per M. I. Gray, Supervisor
Laboratory Records Dept.
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This document consists of 6 pages. No. 14 of 30 copies. Series A.

To: C. N. Rucker

From: S. McLain

Subject: First Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

This memorandum summarizes the work recently accomplished on the Oak Ridge National Laboratory waste disposal problem. A statement of the problems with assignments of work to the various divisions was issued on September 20, 1948, Central Files No. 48-9-158. Weekly Reports will be issued for the next few weeks.

In summary the greatest attention has been given to the removal of the particles carried by the pile cooling air. Some preliminary planning has been directed to the isotope and pilot plant areas. The following paragraphs review the work accomplished to date:

1. Solid Particles in Pile Cooling Air

On August 25, 1948, a slug became stuck in the pile. During removal five slugs became ruptured. While most of the uranium oxide formed on contact of the uranium with air, entered the canal, some oxide was known to have escaped to the stack. A previous stuck slug in December, 1947, had resulted in the escape of relatively large amounts of uranium oxide. This had been considered an isolated case and not likely to happen again. However, immediately after the August episode, every effort was directed to removal of the uranium oxide from the cooling air.

Prior to August 25th, contacts with manufacturers of cyclones, electrostatic precipitators and filters had been started. Increased efforts were then made to obtain full scale equipment. It soon became apparent that filters could be obtained more quickly than cyclones or electrostatic precipitators. Sufficient data were obtained by September 16th to permit a choice of equipment.

It was decided to install immediately two thicknesses of American Air Filter Company, F G 50 glass wool filters followed by Chemical Warfare Service filters number 6. These filters will remove 99.95% of the standard test materials dioctylphthalate and methylene blue. In addition to the filters, cyclones and electrostatic precipitators will be obtained and installed as soon as practicable . It is expected that filters may be obtained within a very few weeks, the cylones in about eight weeks, and the electrostatic precipitators in about eight months. Bids have been requested by September 27th on the cyclones.

The installation of the filters will remove sufficient of the particles escaping from the pile stack to practically eliminate the hazard from this source. The cyclones and electrostatic precipitators will be followed by the filters in the permanent installation.

As soon as the decision was made concerning the types of filters to be installed, design layout of the necessary structure to house the filters was started. The basic layout was presented to the Austin Company for detailed design on September 21st and preliminary grading began on September 22nd by the J. A. Jones Construction Company. The construction work will be continued on two ten-hour shifts daily. Attached are a design layout of the filter installation with a photograph taken on September 23rd of the site being graded.

Each hole in the pile is scanned daily in an attempt to locate swollen slugs prior to rupture. In addition, equipment has been installed to collect relatively large samples of the particles from the pile air going to the stack. Calculations are underway to determine the feasibility of using enriched uranium oxide in place of uranium in the pile.

On September 25th a swollen slug was noted and the cap was found partially broken on removal from the pile. The activity increase was negligible and it is believed very little activity escaped to the stack.

No design work has been done to date on improving the filters on the pile inlet air.

In order to reduce the hazard due to particles becoming re-airborne, the roads, roofs, and as much as possible of the restricted area is wetted down daily. All roads have been heavily oiled and all unnecessary traffic has been eliminated.

In order to check the health aspects of the problem, chest films are being taken on all personnel. Daily nose swipes are being taken on about fifty employees.

2. Solid Particles from Other Sources

Solid airborne particles are believed to originate in the isotope and pilot plant areas as well as in the pile. Preliminary design layout work of the ductwork necessary to collect the air and gas streams containing these particles has been started.

In order to determine the magnitude of the problem, samples will be taken at numerous places in the isotope area during the next Ra La

run. The design of a plant to remove acid gases, iodine, and solid particles will be fixed as soon as data are available.

3. Other Waste Disposal Problems

Work on the evaporator for concentration of the liquid wastes will be completed in a very few weeks. Other than this, little has been accomplished since all effort has been placed on solution of the particle problem.

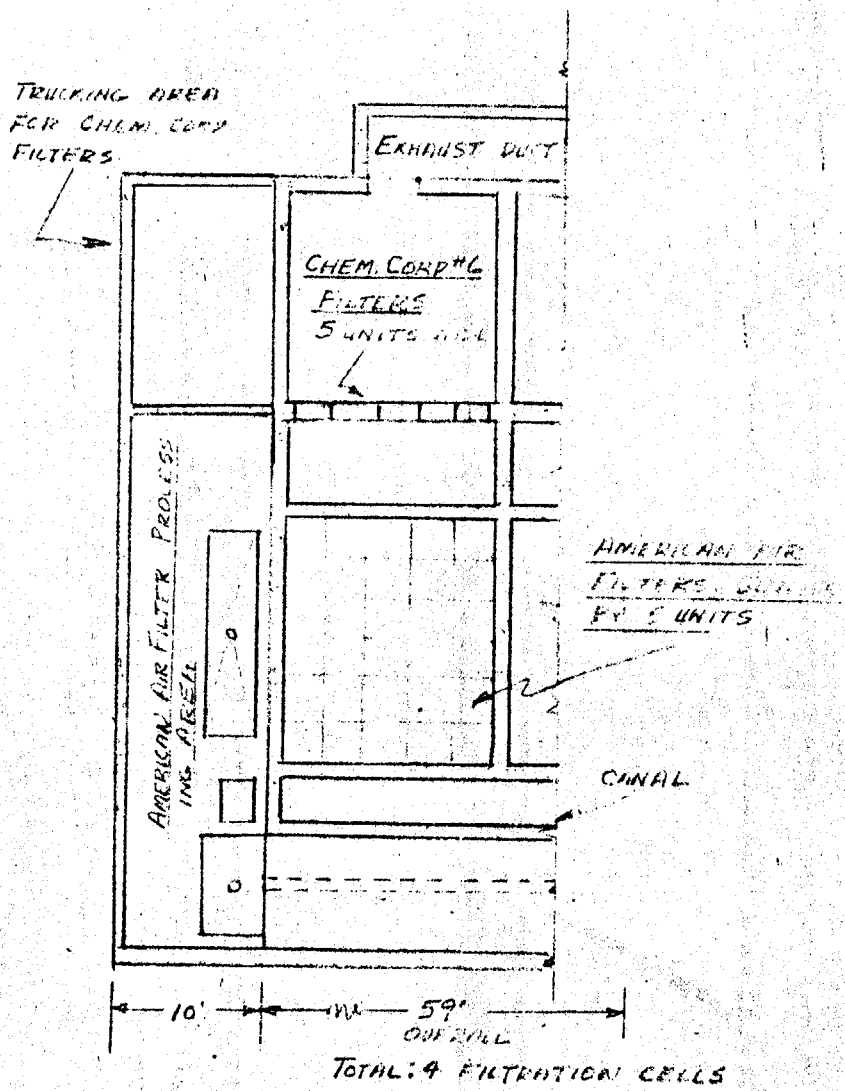
Stuart McLain

Stuart McLain

SMcL:lwb

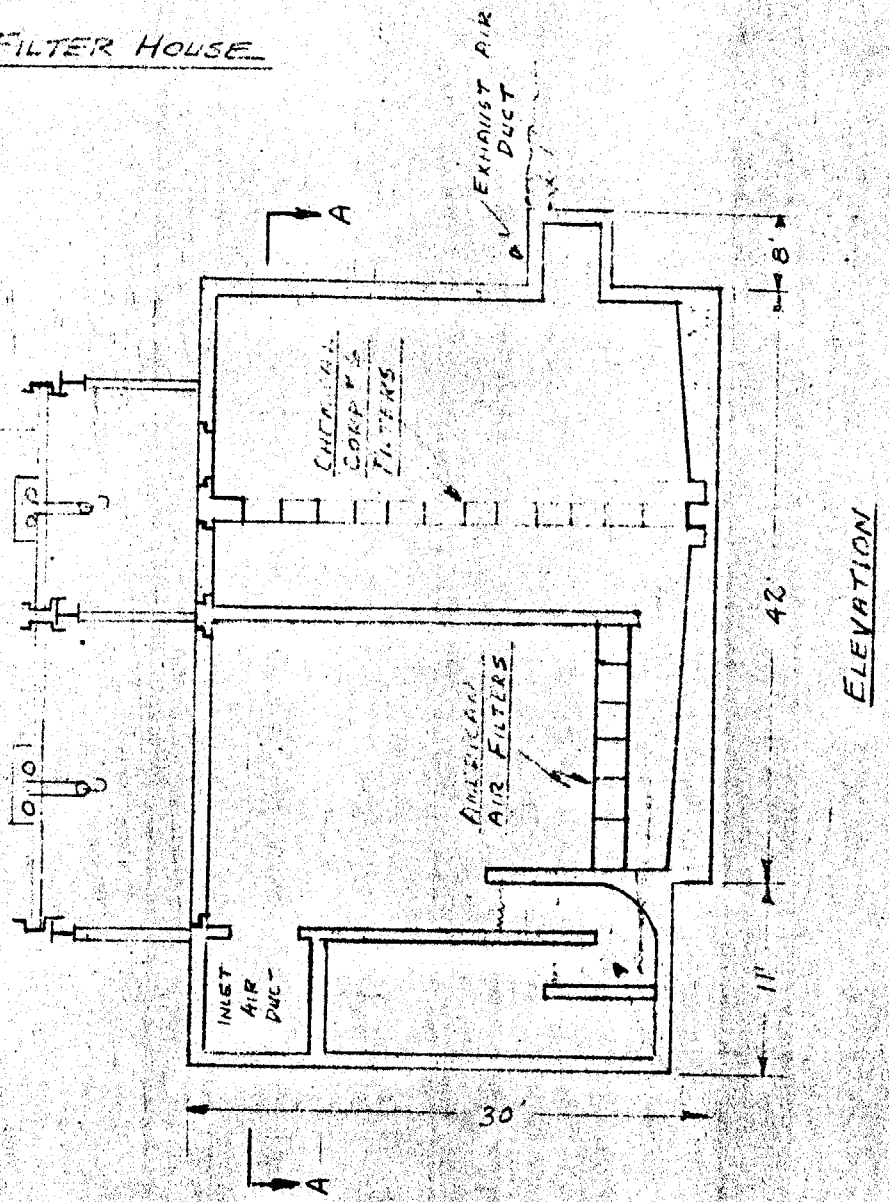
Attachments: (1) Design layout of filter installation
(2) Photograph

PILE COOLING AIR FILTER HOUSE

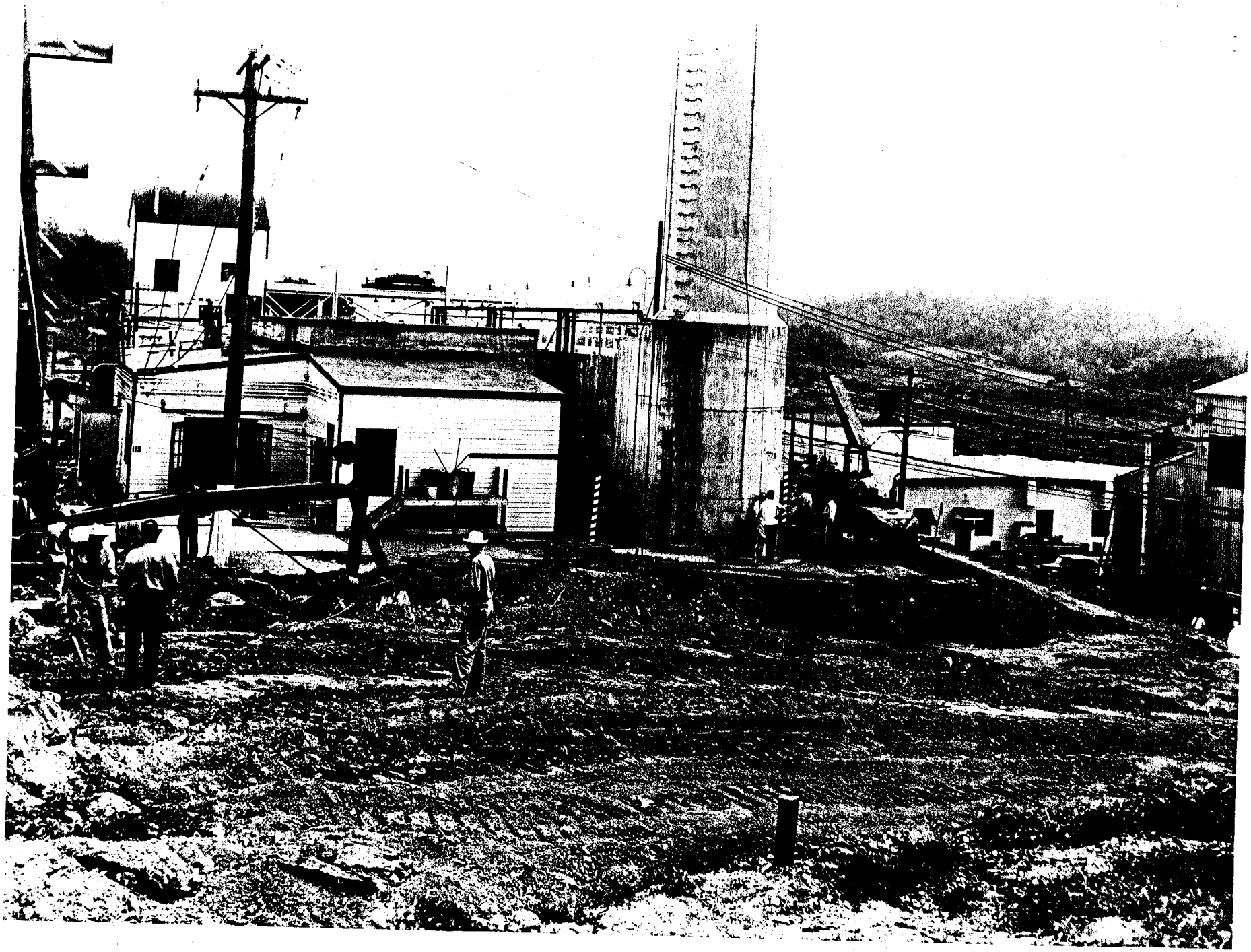


TOTAL: 4 FILTRATION CELLS

PLAN AT A-A



ELEVATION



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OAK RIDGE NATIONAL LABORATORY
CENTRAL FILES NUMBER
48-10- 49

Date October 4, 1948

File

Subject: Second Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

Those Eligible to Read the Attached

To C. N. Rucker

Copy # 19

From S. McLain

BUILDING OGR FILTER HOUSE

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[redacted]

To: C. N. Rucker

From: S. McLain

Subject: Second Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

This memorandum summarizes the work accomplished during the past week on the waste disposal work at the Laboratory. The first weekly report was dated September 27, 1948, Central Files, 48-9-254.

1. Solid Particles in Pile Cooling Air

Rapid progress has been made on the detailed design and construction of a filter building to remove particles from the pile cooling air. Attached is an isometric sketch of the building and a photograph of the construction taken on October 1, 1948. At present the design of the building is nearly complete with the exception of the ductwork and control devices. The forms for the side walls are about one-third completed and the installation of the reinforcing steel is about one-fourth completed. The construction of the entire building is about one-fourth completed. As shown by the isometric sketch, attached, the building has been designed to permit removal of the roughing filters by means of an overhead crane with disposal of the filters by dropping into a canal. Plans call for subsequent removal of the filter media under water, transfer to a coffin, and final burial. Before the filters are removed they will be sprayed with a coating material to hold all activity in place. The filters will be installed in banks with suitable ductwork and valves to permit removal or servicing while the pile is in operation.

Bids have been received on cyclone precipitators. The contract will be let within a very few days. Mr. A. L. Labbe, a specialist connected with the American Smelting and Refining Company, will aid our engineers in the conceptual drawings of an electrostatic precipitator during the coming week.

In last week's report it was incorrectly stated that a slug stuck in the pile on August 25th. The correct date was August 31st.

[redacted]

2. Pile Operation

On September 25th a swollen slug was detected in the pile. No increase in the activity of the exhaust air from the channel could be noted by the routine activity scanner. On discharge of the slugs from the channel one slug was found to have the aluminum cap pried loose from the can. Very little oxide escaped to the pile cooling system.

In order to determine the amounts of activity which are escaping up the pile stack a cyclone test unit was installed to measure the total amount of solid material and the activity under various pile operating conditions. The characteristics and source of the active particles will be determined. The unit was installed September 23rd and removes particles from 0.025% of the pile air. The particles collected range from several hundred microns to approximately ten microns diameter. Size distribution studies are being made. The data obtained are summarized in the table below.

	Particles in Air Duct			
	Amounts, gms/hr		Activity, mc/hr	
Period	Min.	Max.	Min.	Max.
30 hrs prior to removal of ruptured slug, 9-25	14	2.5	0.02	0.1
48 hrs after slug removal	1.5	3	1	2

It is believed that most of the increased activity after the slug failure was due to stirring up dust when the slugs were pushed and the fans restarted.

On October 1st a Chemical Warfare Service filter paper #6 was installed after the cyclone test unit. The filter had an area of 0.44 square feet. The filter picked up one microcurie of activity in the first test of five minutes. Almost all of this activity decayed in twenty-four hours. Incomplete data indicate the long-lived activity picked up by the full scale CWS filters per day will not be excessive.

The pile has been shut down most of the time since September 25th. For one week after the failure it was operated only when there was

a wind up the valley of over five miles per hour and when there was no inversion. The pile was started on October 2nd, on regular operating schedule. If further slug ruptures occur the pile may be down a large percentage of the time until the filter building is completed. This may result in cancellation of several isotope orders and probably result in failure to meet shipping dates on others.

The eleven slugs loaded into the pile in April, 1948 and maintained at 350°C were discharged to eliminate possible slug ruptures.

During the past week the inlet and exhaust ducts from the pile and fans were cleaned. The activity in the exit duct was decreased from approximately 1,200 mr per hour to about 300 mr per hour.

3. Area Decontamination

There are about 300,000 square yards of Laboratory area in various stages of vegetative coverage ranging from bare rock to heavily grassed areas. The bare soil and partially grassed areas will be covered with good topsoil and seeded this fall. The present grassy areas will be cut to decrease the danger of dusts blowing within the area.

About 120,000 square yards of streets, parking lots, road shoulders, and other areas subject to vehicular traffic will be paved by applying Armor-coat surfaces. Some roads will be closed and covered with soil and seeded.

4. Health Check

Chest films have been taken on most of the employees. These have not been read to date.

Initial steps have been taken to study 500 blood counts ranging from the middle of 1946 to the middle of 1948. This is a preliminary or scouting study only. The counts will be grouped into certain periods of time and compared between the separate years.

About 30 to 40 nasal swipes are being taken each night for determination of radioactive material. Results have not been obtained to date.

5. Particles from Other Sources

Experimental and design studies have been started to determine the magnitude of the particle problem in respect to the circulating air and off-gas from the isotope and pilot plant areas. Several experimental cyclones and circulating pumps have been obtained. K-25 representatives are aiding in the design of an apparatus to measure the particles and activities which pass the Chemical Warfare Service #6 filters.

6. Slug Improvement

Experiments have been started in an attempt to determine the causes of slug ruptures. Holes 0.038 inches diameter were drilled through ten slugs. These slugs were heated at 250°C (482°F) with air at a velocity of 60 feet per second for 84 hours. No sign of swelling or failure occurred.

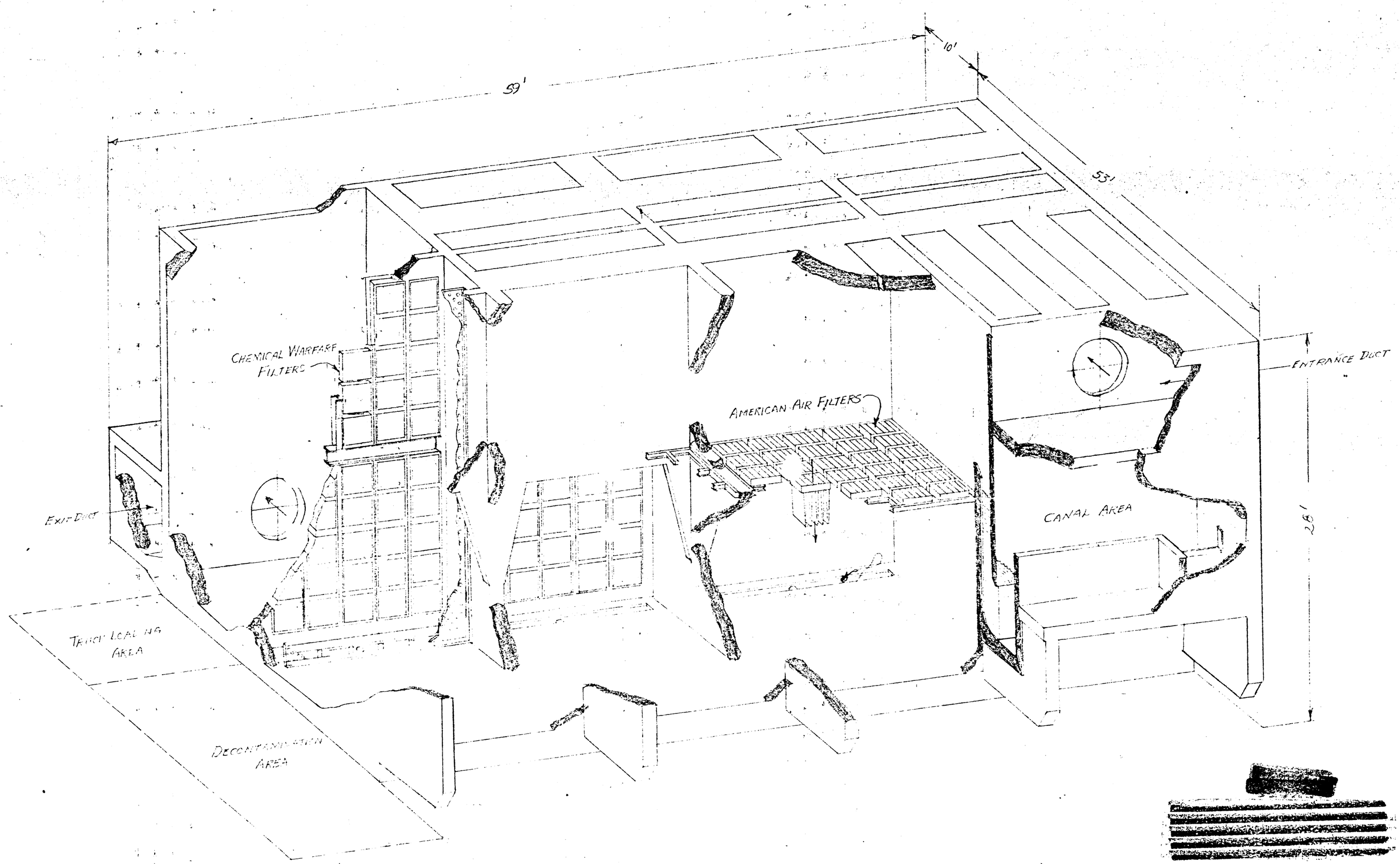
Studies to determine if enriched uranium oxide might be used in the pile have shown that this may be feasible. Further calculations on pile loading and discussions with representatives of K-25 and the Atomic Energy Commission will be held.

Representatives from Brookhaven National Laboratory visited the Laboratory to discuss the possibility of using the Brookhaven type of slug in the Oak Ridge pile. Design studies are being made to determine if these slugs could be charged and discharged from the pile.

Stuart McLain

Stuart McLain

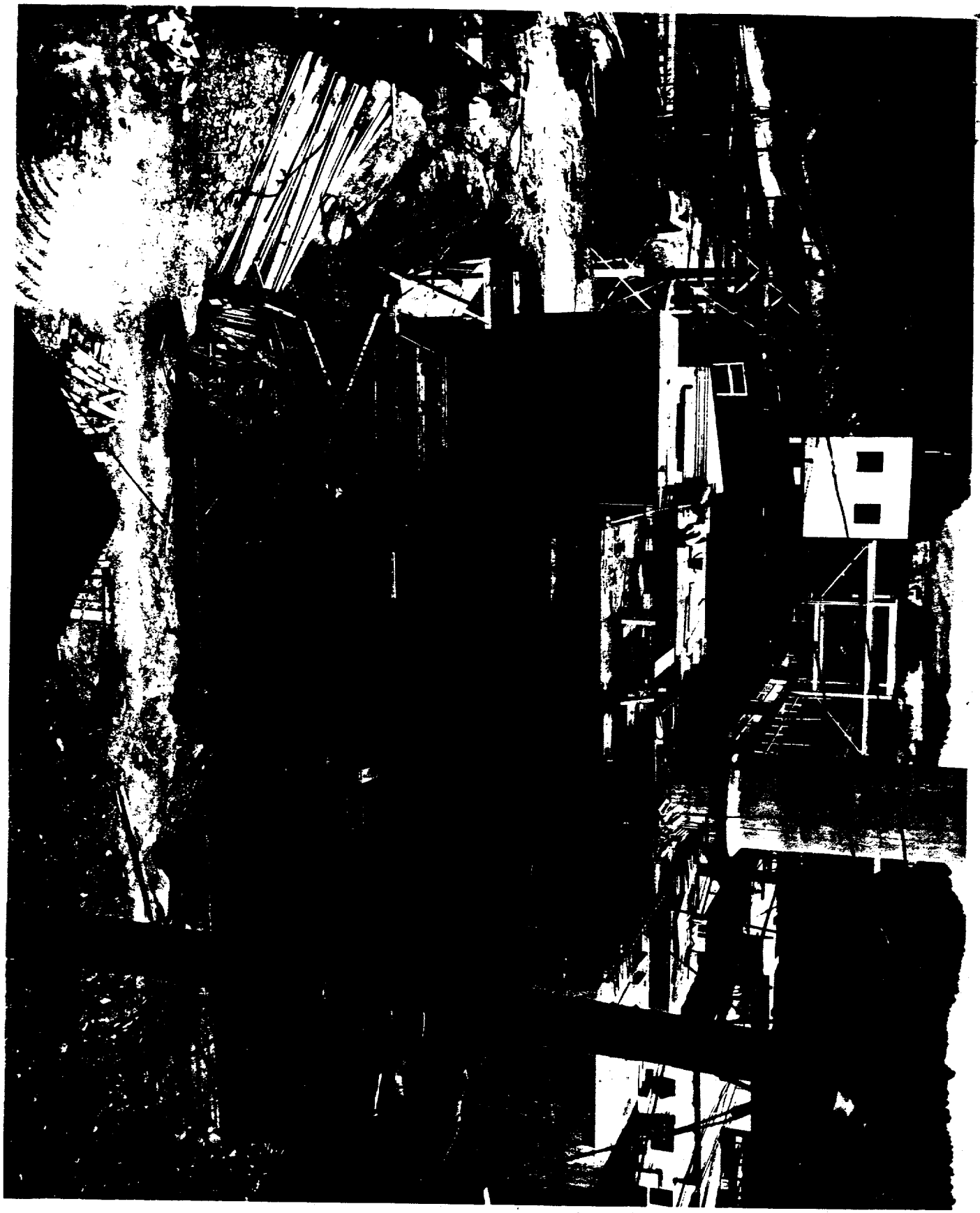
SMcL/mmd
Attachments



NOTE: OVERHEAD CRANE NOT SHOWN

APPD.	DATE	OAK RIDGE NATIONAL LABORATOF
		TECHNICAL DIV. — P.O. BOX [redacted] — OAK RIDGE, TEN
		PILE AIR PURIFICATION SYSTEM AIR FILTER BUILDING ISOMETRIC CUTAWAY
		DRAWN BY / DATE / SCALE NONE
		CHECKED BY / DATE / DRAWING NO. TD-836

#1324



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OAK RIDGE NATIONAL LABORATORY
CENTRAL FILES NUMBER
48-10-49

Date October 4, 1948	File
Subject: Second Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal	Those Eligible to Read the Attached
To C. N. Rucker	Copy # 14
From S. McLain	

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To: C. N. Rucker

From: S. McLain

Subject: Second Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

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Stuart McLain

Stuart McLain

SMcL/mmd
Attachments

[redacted]

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OAK RIDGE NATIONAL LABORATORY
CENTRAL FILES NUMBER
48-10- 132

Date October 11, 1948

File C.7.

Subject: Third Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

Those Eligible to Read the Attached

To: C. N. Rucker

Copy # 5A

From: Stuart McLain

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For: M. T. Bray, Supervisor
Laboratory Records Dept.

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This document has been approved for release to the public by:

David R Hamm 5/19/95

Technical Information Officer
ORNL Site

Date

This document consists of 61 pages. No. 5 of 34 copies. Series A.

October 11, 1948

To: C. N. Rucker

From: Stuart McLain

Subject: Third Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

This memorandum summarizes the work accomplished during the past week on the waste disposal work at the Laboratory. The second weekly report was dated October 4, 1948, Central Files 48-10-49.

1. Solid Particles in Pile Cooling Air

The construction of the building to house filters for the exit pile cooling air has progressed satisfactorily. The forms for the walls are over one-half completed and pouring of the lower section will take place in a very few days. Photographs attached show the status of the building.

Cyclones have been ordered for delivery in about eight weeks. Representatives of the Laboratory visited Mr. A. L. Labbe, a specialist on electrostatic precipitators, connected with the American Smelting and Refining Company. This company, through Mr. Labbe, furnished complete layout drawings and specifications for an electrostatic precipitator plant. Mr. Labbe suggested necessary changes to fit our particulate problem. Nevertheless the Laboratory will have to do a great deal of design and experimental work before an installation can be started.

2. Pile Operation

During the week the pile was run on regular operating schedule. No slug ruptures occurred.

Studies of particles escaping to the stack have shown that greatly increased amounts of particulates escape when slugs are pushed from the pile.

3. Particles from the Isotope Area

Studies of the off-gas from the dissolver in the present isotope area, Building 706-D, have shown that the volume of gases is 40 to 60 CFM depending on the number of jets used, the vessels connected, and manner of operation. The vessel vent line has been found to carry a maximum of 175 CFM.

Circulating air through the isotope cells is about 6,500 CFM. Measurements of activity and particles will be made during the RaLa run which will be started on October 20th.

4. Area Decontamination

Attached is a sketch showing the areas to be paved. Oil has been ordered for this paving and work will be underway in about two weeks. Grassing of open areas will start in a very few days.

A survey of the particles in the area is being made at present.

5. Slug Improvement

The experimental work on ten slugs with 0.038 inches diameter holes drilled through the aluminum cans has continued. The slugs have been heated at 250°C. (482°F.) with air at 60 feet per second. After 100 hours the slugs began to swell and after 200 hours there are raised areas approximately 1/16 inch high and one inch diameter around the drilled holes.

6. Masks

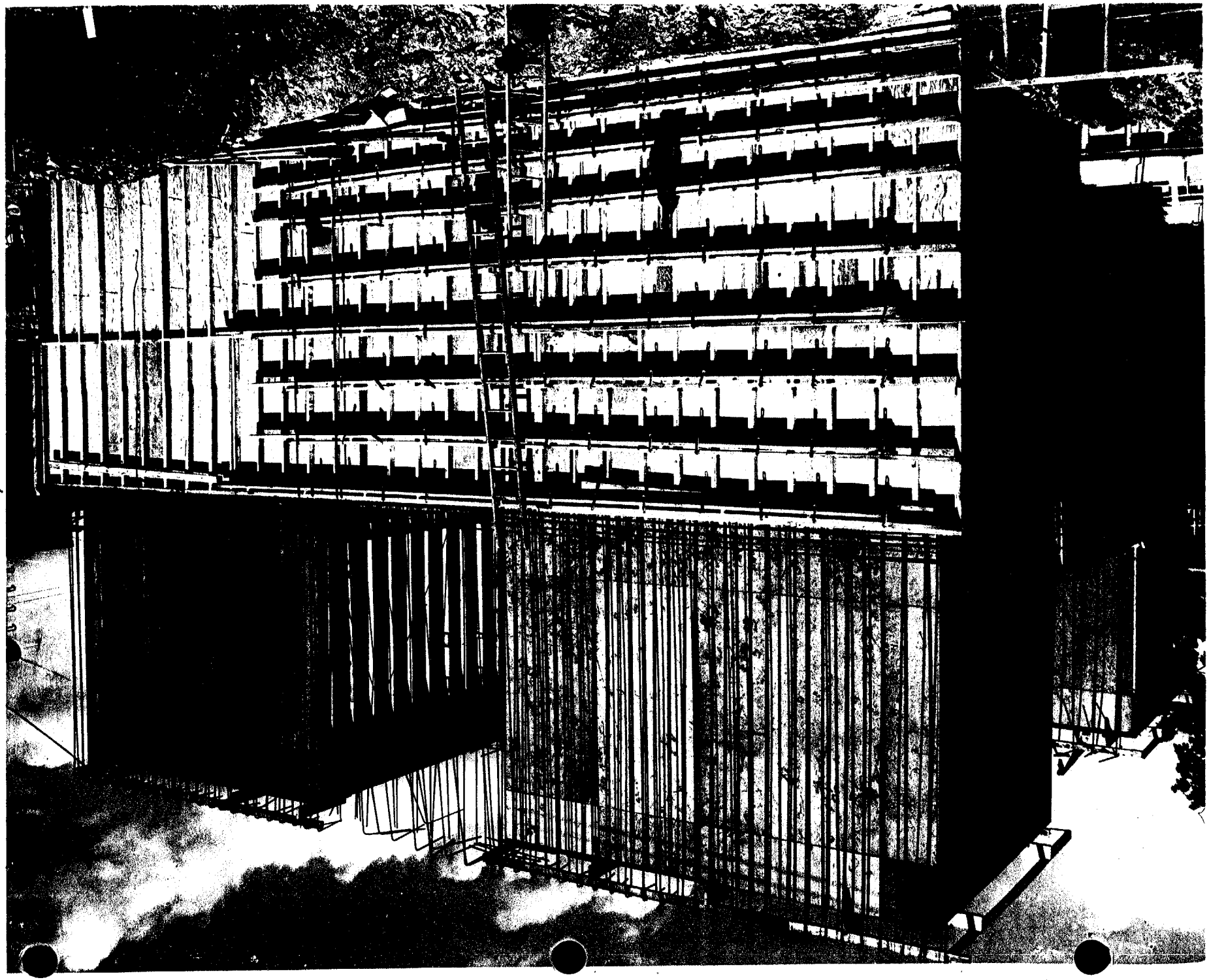
Two hundred assault masks with Chemical Warfare Service #6 paper filters have been ordered. In addition 200 Comfo metal fume respirators are on order.

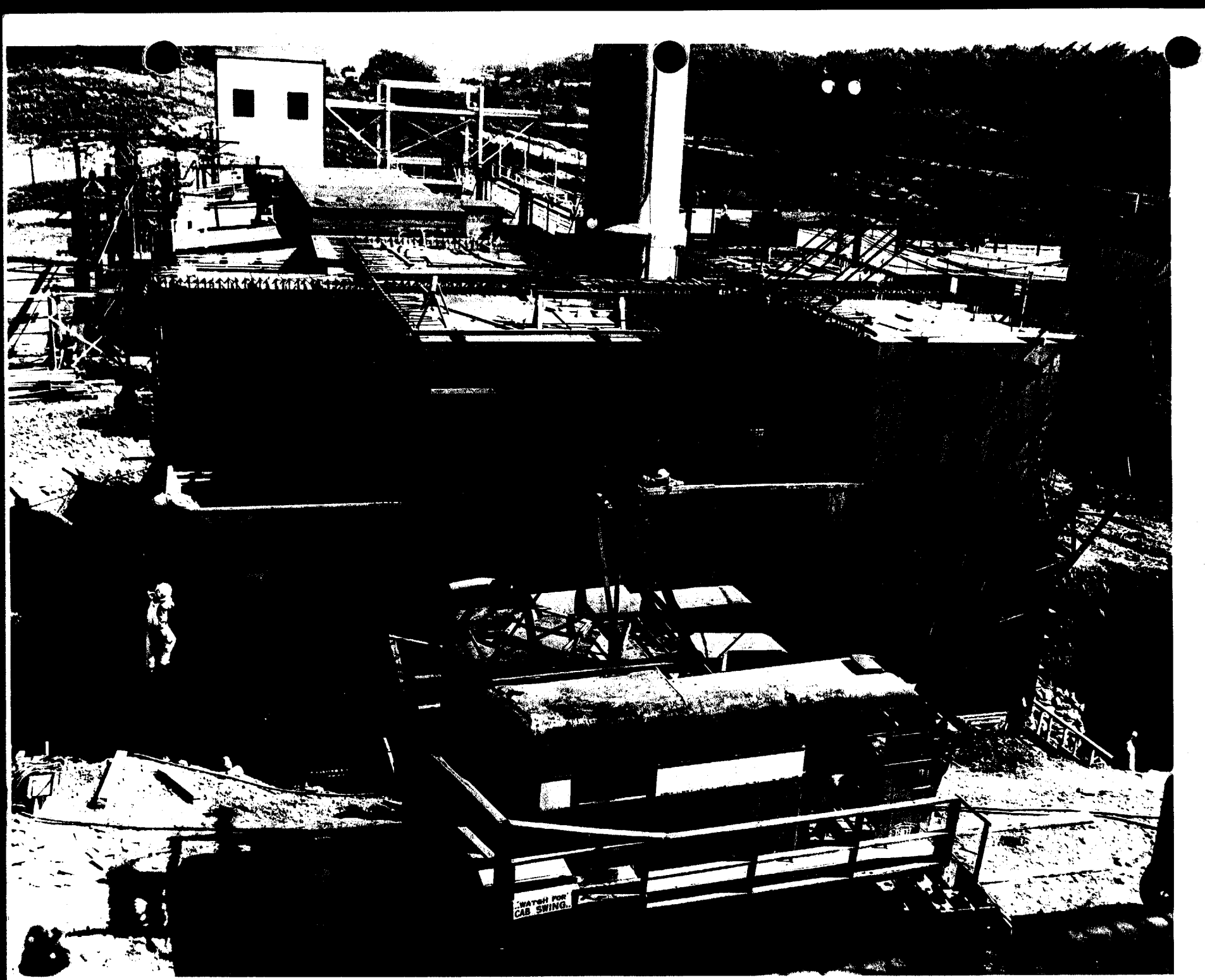
7. Health Check

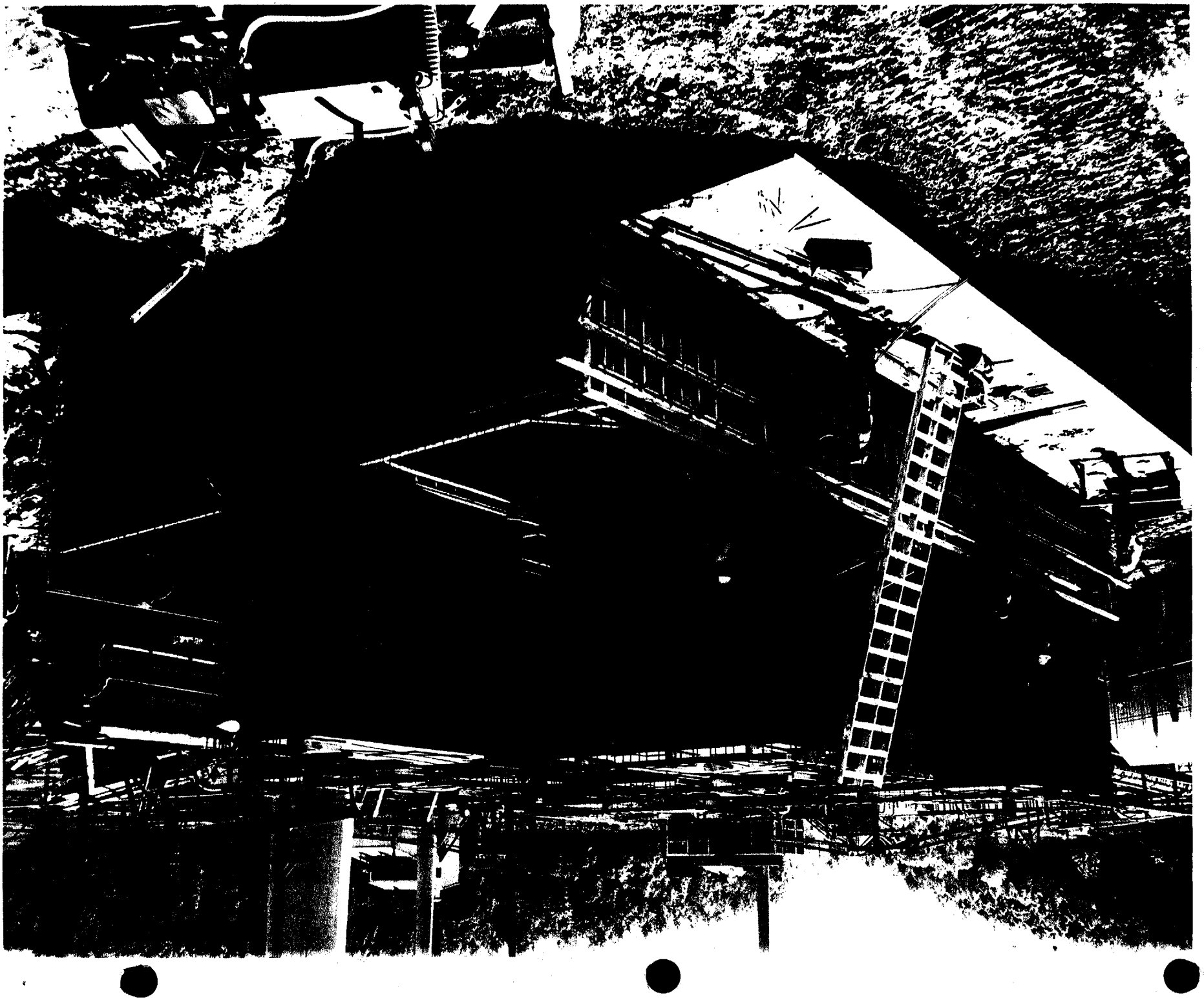
Six hundred and nineteen chest films have been interpreted to date. Twenty of these have shown small areas of a questionable nature which will require additional interpretation at the end of the survey. Nothing unusual has been found. All the others are completely negative. It is estimated the interpretation of the films will require two additional weeks.

Stuart McLain

SMcL/mmd
Encls.




WATCH FOR
CAB SWING



Roads and areas shaded shall have 1½" plant mixed asphalt suface after scarifying and resurfacing.

N22,000.00

LEGEND

729 ------ Building, steps & building number.

6 ------ Monument.

50 5 ------ Emergency generator & number.

------ Fence & gates.

------ Post & cable fence.

------ Road.

------ Concrete or cinder block retaining wall.

------ Timber retaining wall.

------ Sign.

------ Existing grass

N21,500.00

------ Radio-isotope area

------ Landscaping under contract.

------ Proposed grassing

------ Road shoulder

------ Ditch

------ Existing bituminous surface.

PRELIMINARY

N21,000.00

DUST 603 CONTROL

BUILDINGS & ROADS

JULY 1, 1948

MONSANTO CHEMICAL COMPANY

CLINTON LABORATORIES
KNOXVILLE TENNESSEE

REV. NO.	REVISIONS	APPROVED BY DATE
9	Revised to July 1, 1948	

REFERENCE DRAWINGS

PROJ. NO. ____ SCALE 1/20 DATE

DRAWN BY	R.B.T. - J.H.G. - E.G.T.	9-1-45
CHECKED BY	J.H.G. - E.G.T.	10-1-45
APPROVED BY		10-2-45
APPROVED BY		
APPROVED BY	PROJ. ENGR.	10-2-45

DWG. NO. E-542A

E 32,500.00

N

C.E.W. Meridian

N23,500.00

E33,000.00

N23,000.00

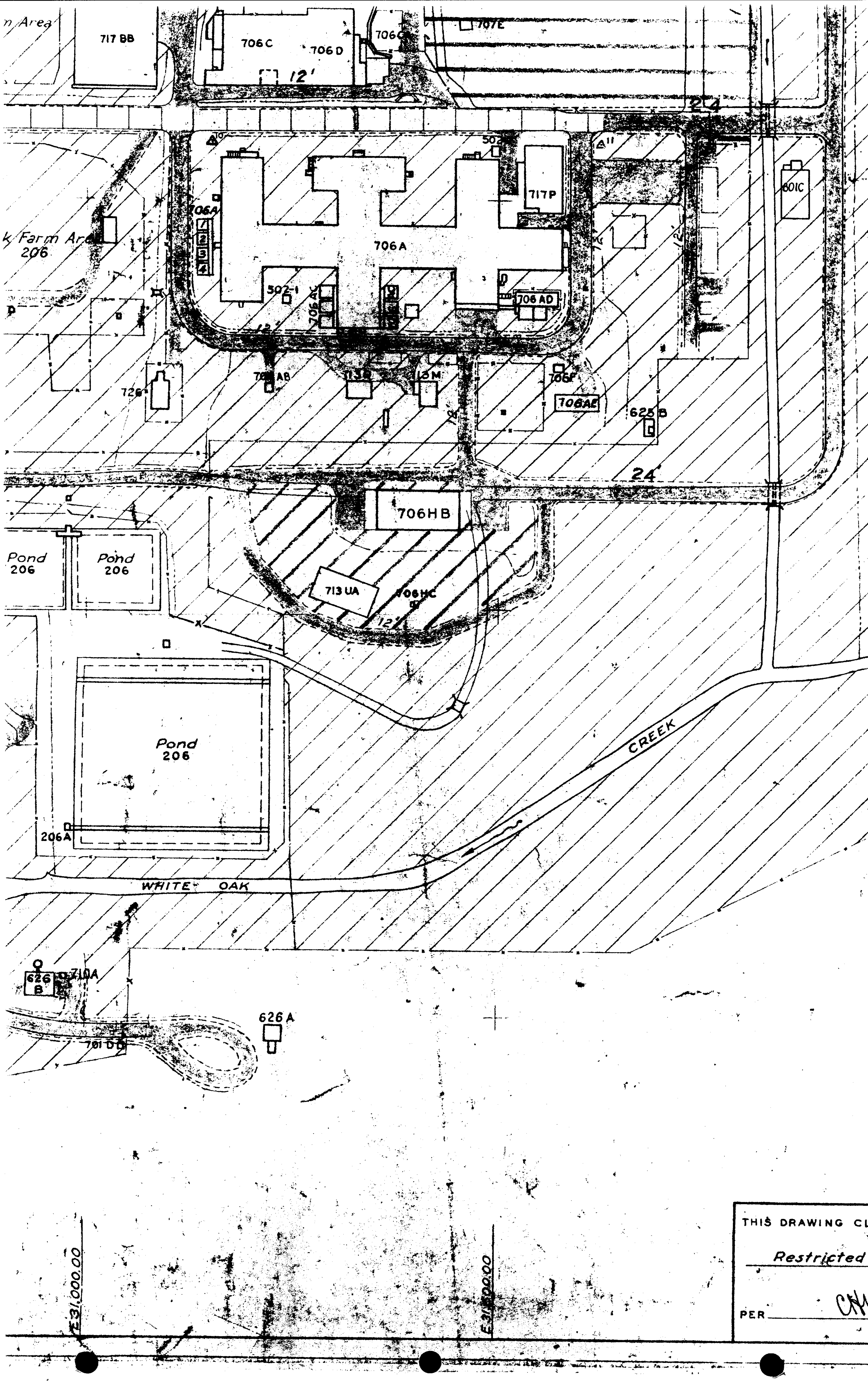
606 B

N22,500.00

NOTE:
Roads and areas shaded shall have 1½" plant mixed asphalt suface after scarifying and resurfacing.

N22,000.00

LEGE



n Area
717 BB
706 C
706 D
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12'
707E
24
502
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706A
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k Farm Area
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706 AC
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706 AB
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713M
706F
706AE
625 B
24
706HB
Pond
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713 UA
706HC
12'
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CREEK
WHITE OAK
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B
710A
626 A
701 D
E 31,000.00
E 31,500.00
THIS DRAWING CL
Restricted
PER

E 31,000.00

E 31,500.00

ROAD

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12'

501 C

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706 B

115

807

204

Stock

103

102

713 W

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706 D

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706 A

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1

2

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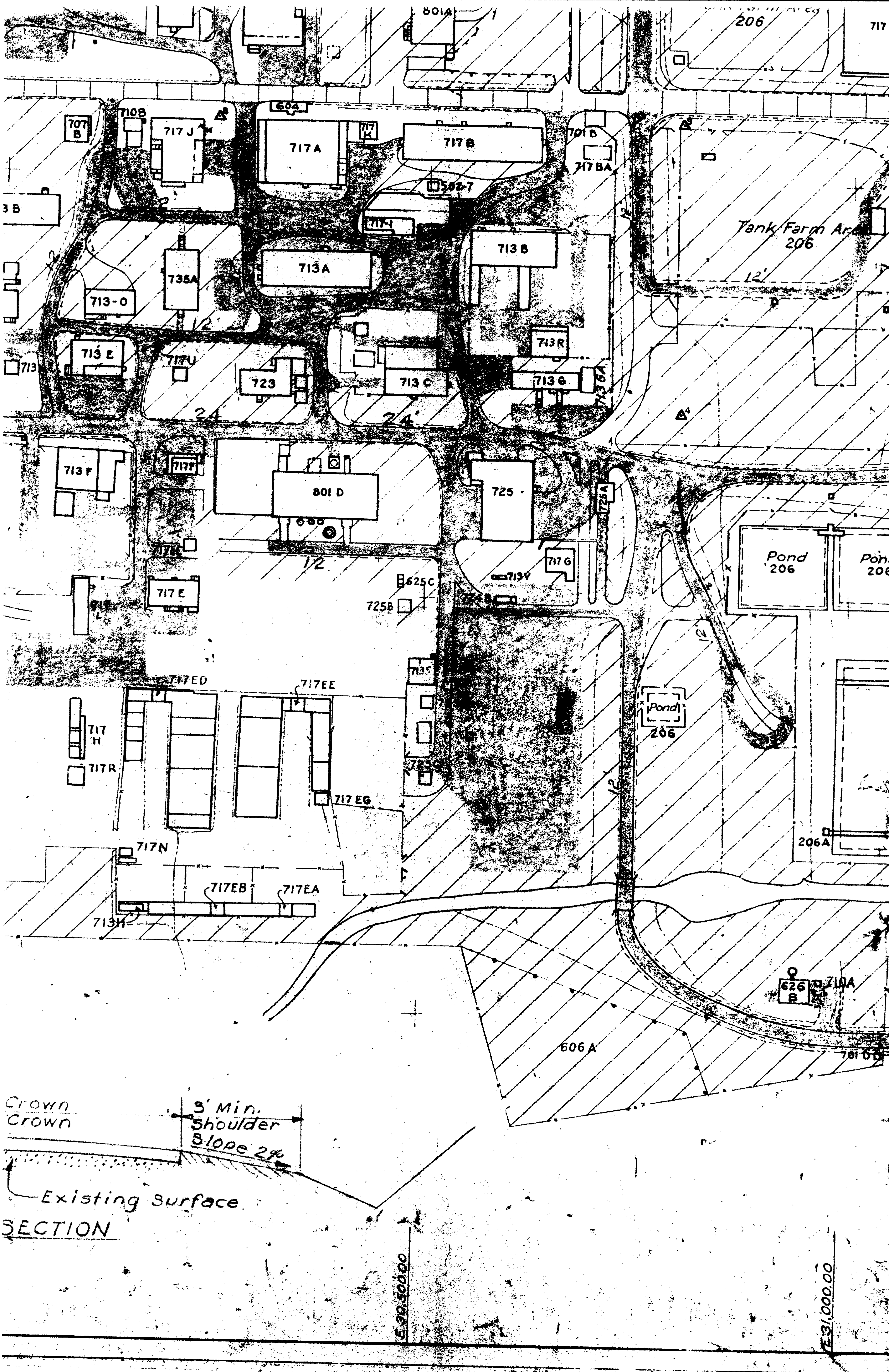
502-1

706 AC

706 AD

12'



801A
206
717
604
710B
707 B
717 J
717 A
717 K
717 B
701 B
717 BA
502-7
717-I
Tank Farm Area
206
12'
713 B
713 A
735A
713-0
12
713 E
713
717U
723
713 C
713 R
713 G
713 6A
24'
24
713 F
717F
801 D
725
725A
12
Pond
206
717 G
713V
724B
717 E
625C
725B
717 L
713S
717ED
717EE
717 H
717R
717 EG
725C
Pond
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12'
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717N
717EB
717EA
713H
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606 A
701 D
Crown
Crown
3' Min.
Shoulder
Slope 2%
Existing Surface
SECTION
E 30,500.00
E 31,000.00

E 30,000.00

E 30,500.00

E 31,000.00

BETHEL VALLEY

J. A. JONES CO. AREA

24'

12'

701E

101D

104B

815

701F

726A

502-6

713AF

104A

707DA

706BB

706B4

706B

105 E

719B

12'

502-5

36'

706G

Stock

704A

707C

205

24'

701G

735B

717EF

802

812

813

501

811

719AB

502-8

719A

713AF

801AB

717C

801A

Tank Farm Area 206

717

710B

701 B

717J

604

717A

717K

717B

701B

717BA

502-7

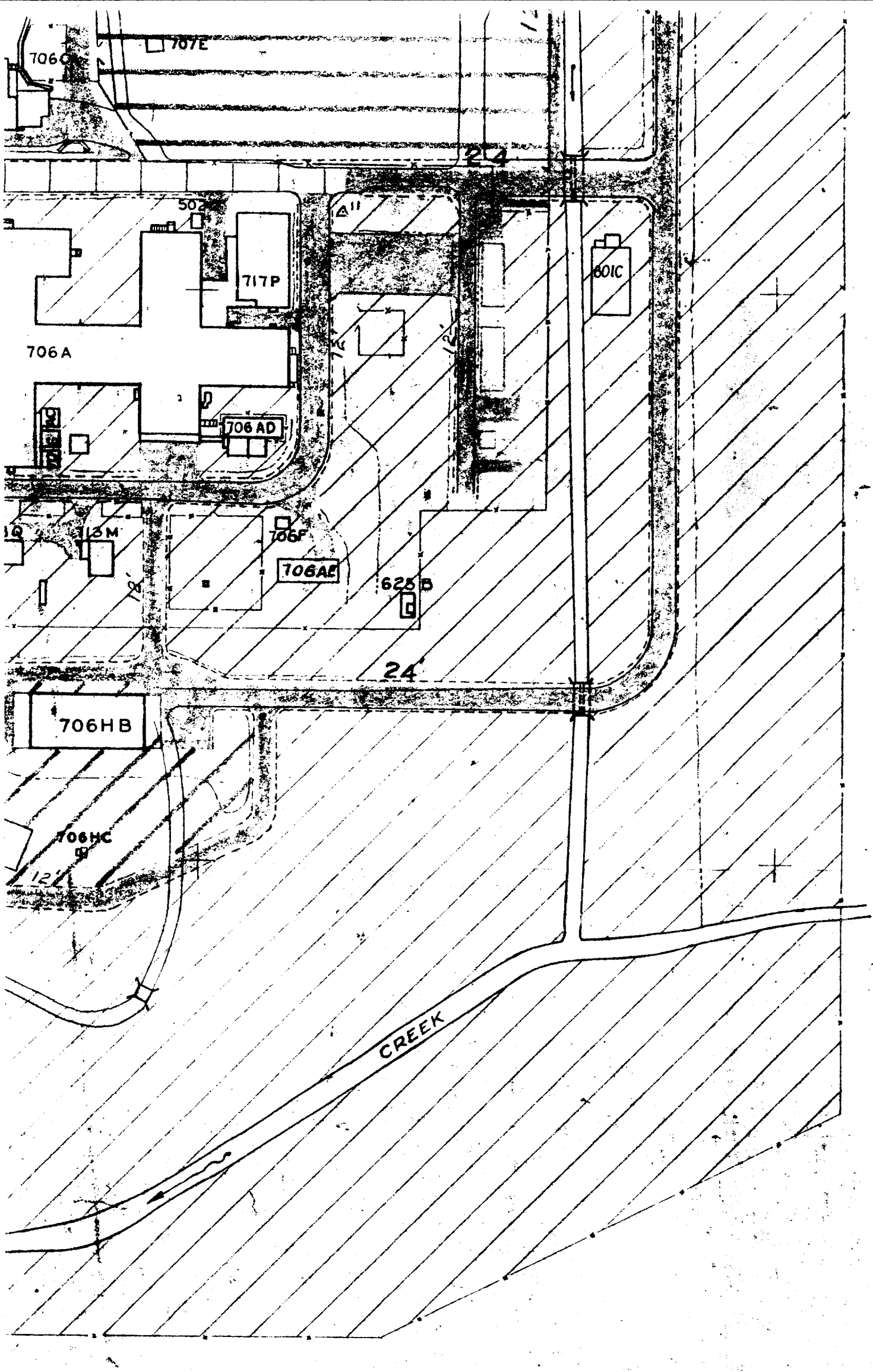
713B

713A

735A

13-0

Tank Farm Area 206



E 32,000.00

E 31,500.00

THIS DRAWING CLASSIFIED AS:-

Restricted

PER C.H. Marsh

REV. NO.	REVISIONS
9	Revised to July 1, 1948

E 32,000.00

E 32,500.00

24'

101 B

713 Y

12

701K

21

606 B

12

24

24

11

717P

801C

706 AD

NOTE
Roads and areas
mixed asphalt su

LE

Roads and areas shaded shall have 1½" plant mixed asphalt suface after scarifying and resurfacing.

N22,500.00

LEGEND

729 ------ Building, steps & building number.

△6 ------ Monument.

50 ------ Emergency generator & number.

------ Fence & gates.

------ Post & cable fence.

------ Road.

------ Concrete or cinder block retaining wall.

------ Timber retaining wall.

------ Sign.

------ Existing grass

N21,500.00

------ Radio-isotope area

------ Landscaping under contract.

------ Proposed grassing

------ Road shoulder

------ Ditch

------ Existing bituminous surface.

PRELIMINARY

N21,000.00

DUST 603 CONTROL

BUILDINGS & ROADS

JULY 1, 1948

MONSANTO CHEMICAL COMPANY

CLINTON LABORATORIES

KNOXVILLE TENNESSEE

NO.	REVISIONS	APPROVED BY DATE
	Revised to July 1, 1948	

REFERENCE DRAWINGS

PROJ. NO.	SCALE 1/60 DATE
DRAWN BY	R.B.T. - J.R.S. - E.G.T. 9-1-48
CHECKED BY	J.H.G. - E.G.T. 10-1-48
APPROVED BY	10-2-48
APPROVED BY	
APPROVED BY	PROJ. ENGR. 10-5-48

DWG. NO. E-542A

N

C.E.W. Meridian

E 32,500.00

N23,500.00

E33,000.00

N23,000.00

606 B

N22,500.00

NOTE:
Roads and areas shaded shall have 1½" plant mixed asphalt suface after scarifying and resurfacing.

N22,000.00

LEGEN

[redacted]

OAK RIDGE NATIONAL LABORATORY
CENTRAL FILES NUMBER
48-10-236

Date October 18, 1948

File

Subject: Fourth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

Those Eligible to Read the Attached

To: C. N. Rucker

Copy # 19

From: Stuart McLain

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13. T. W. Hungerford
14. S. Lawroski, Argonne
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23. C. N. Rucker
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30. C. N. Wedgerwood
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32. Central Files
33. Central Files
34. Central Files

[redacted]

DECLASSIFIED Per Letter Instructions Of Dec-1116 Dave Patterson
For: M. T. Bay, Supervisor Laboratory Records Dept. ORNL

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Technical Information Officer ORNL Date

RELEASE APPROVED BY PATENT BRANCH
4-15-59 M.S.
DATE SIGNATURE

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David R Hamrin 5/19/95
Technical Information Officer ORNL Site Date

[redacted]

This document consists of 8 pages. No. 19 of 34 copies. Series A.

To: C. N. Rucker

From: Stuart McLain

Subject: Fourth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

This memorandum summarizes the work accomplished during the past week on the waste disposal work at the Laboratory. The third weekly report was dated October 11, 1948, Central Files 48-10-132.

In general work has progressed in the direction of removal of radioactive particles from the stack streams and in obtaining information concerning the decontamination of the area.

1. Solid Particles in Pile Cooling Air

The construction of the building to house filters for the exit pile cooling air has continued. The lower section of the walls has been poured and the reinforcing steel for the upper part of the walls is nearly complete. The building is about one-half complete. The ductwork excavation is over one-half done but the forms have not been started. Photographs, attached, show the present status of the building construction.

A preliminary layout of a building to house the cyclones and electrostatic precipitators has been made up. A representative of the Laboratory will visit the Trion Company at McKees Rock, Pennsylvania, next week for the purpose of obtaining data on the electrostatic precipitators produced by the Trion Company. After this information has been obtained, a decision as to precipitator type to be installed will be made and the design started.

[redacted]

2. Pile Operation

The pile was operated through October 15th on regular operating schedule. On October 16th it was shut down to permit data on decontamination to be obtained. No slug ruptures occurred.

3. Particles from the Isotope Area

It was decided that it will be essential to install temporary equipment to remove particles from the off-gas, vessel vent, and cell ventilation air streams from the isotope area before another RaLa run can be made. Initial design of this equipment has been started on a high priority basis. It is tentatively planned to scrub the off-gas and vessel vent lines with caustic and run the gas through wet cyclones before these streams are combined with the cell ventilation air. The combined streams will be run through two thicknesses of American Air Filter Company's FG #50 glass wool bats.

The off-gas and the vessel vent air from the Pilot Plant will be handled by this same temporary plant. No attempt will be made to include the cell ventilation air from the Pilot Plant. The hoods in the special isotope area building, 706-C, will not be handled in the temporary plant.

4. Area Decontamination

Planting of grass on the East End of the Laboratory area has been started. All unpaved roads are being kept well oiled. All blacktop roads and sidewalks are washed each night.

The pile cooling air fan house was roofed with a gravel covered tar paper. This was found to have excessive activity. It has been covered with a smooth tar finish to permit washing down.

In order to determine the relative amounts of radioactive particles being thrown out of the pile, pile plant, semi-works, and other sources compared with the amounts that become re-airborne during normal operations, all facilities possibly producing active particles were closed down on October 16th. Data will be taken for several days and then the equipment will be started one item at a time.

[redacted]

5. Slug Improvement

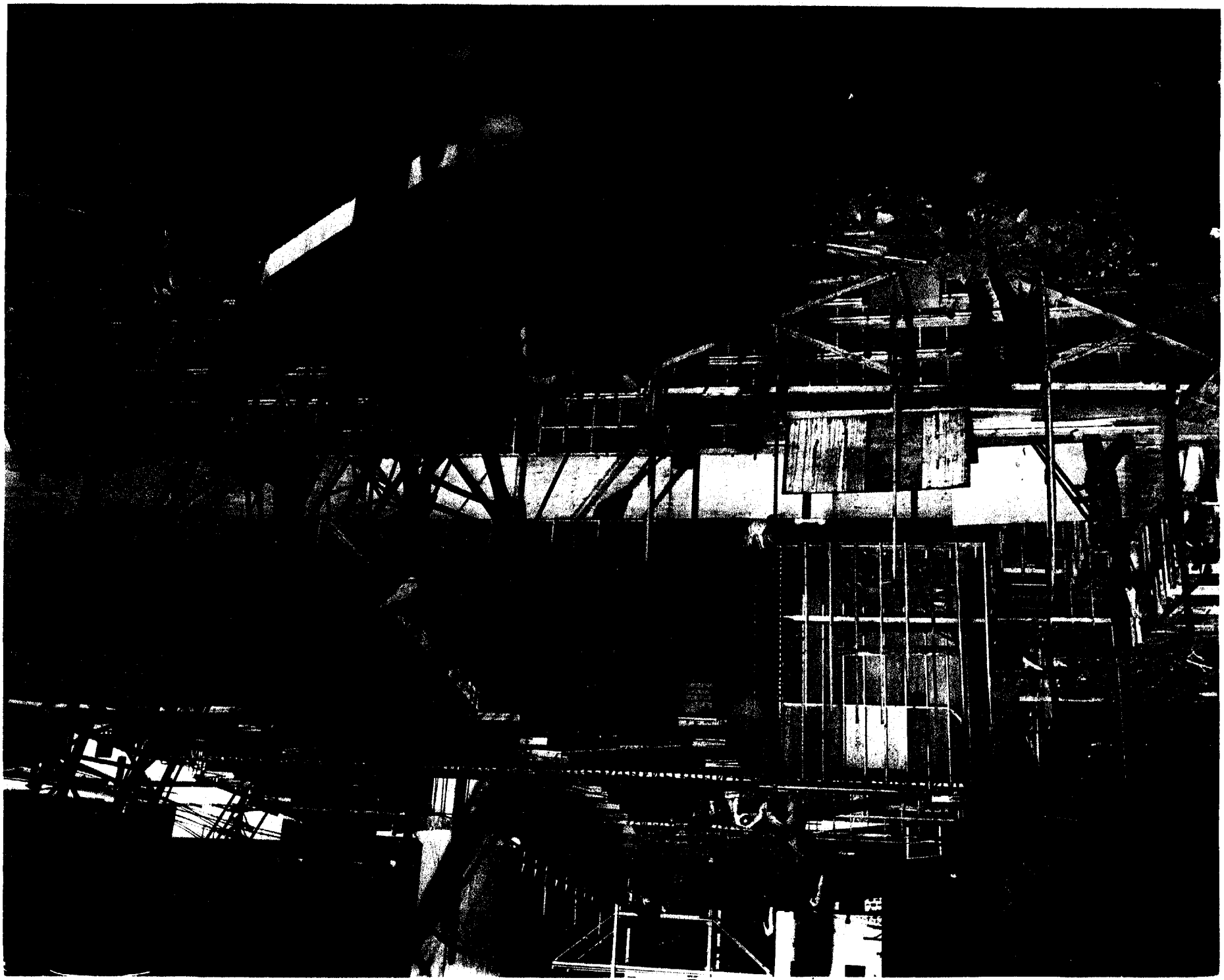
Work on temperature recycling has indicated this may be very important in slug failure. A memorandum giving test results was issued October 14, 1948, Central Files 48-10-148. A report by C. D. Cagle and L. B. Emlet, "Slug Ruptures in the Oak Ridge National Laboratory Pile", ORNL-170, was issued October 13, 1948. This report reviews the slug ruptures and gives the test procedures in use to sort out the poorly canned slugs before use in the pile.

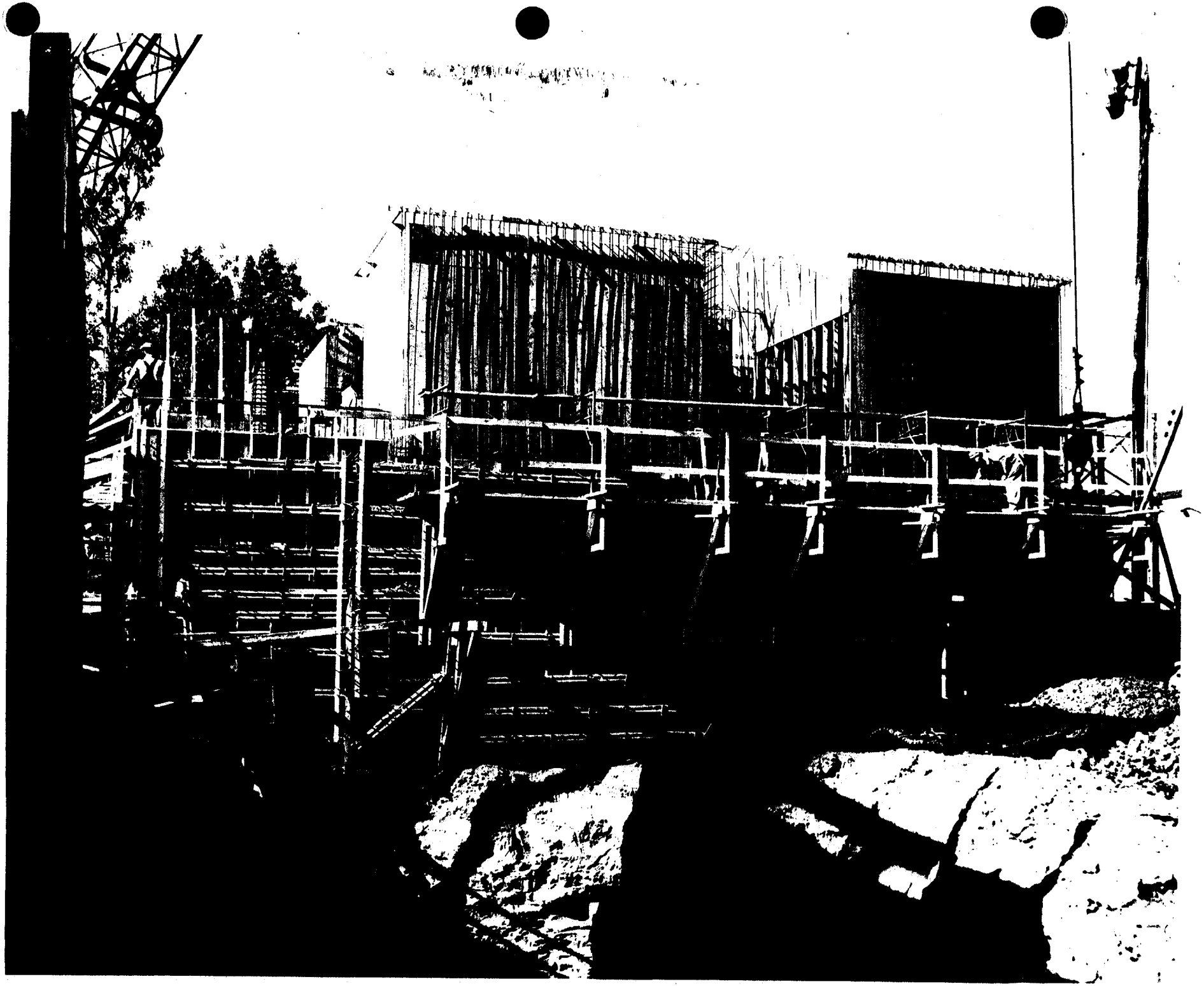
6. Health Check

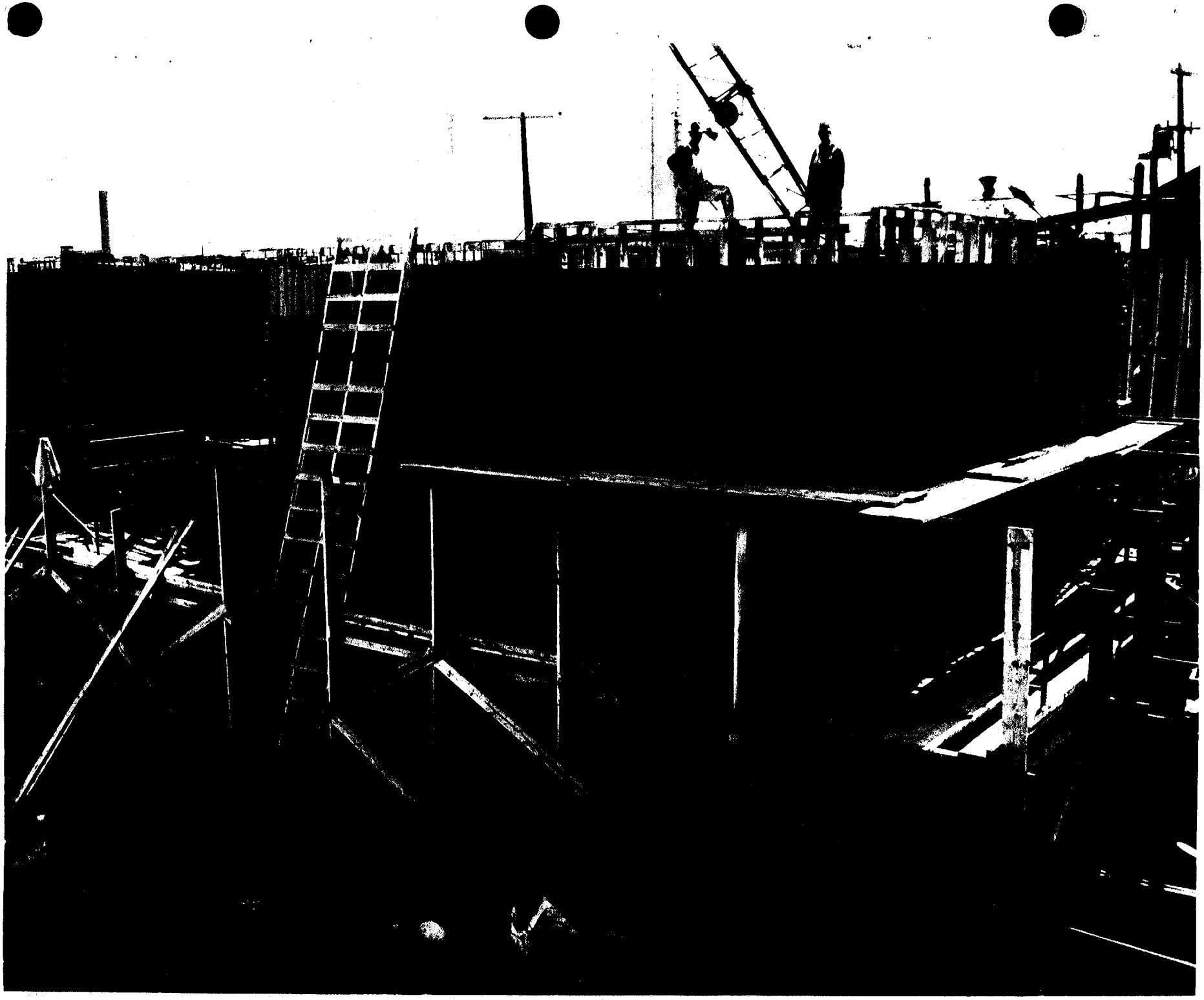
Three hundred and eighty-five additional chest X-rays were interpreted during the past week. Nothing unusual has been found to date.

Stuart McLain

SMcL/mmd
Encls.







Roads and areas shaded shall have 1½" plant mixed asphalt suface after scarifying and resurfacing.

N22,000.00

LEGEND

729 ---------- Building, steps & building number.

Δ^6 ---------- Monument.

50 ℄-5 ---------- Emergency generator & number.

---------- Fence & gates.

---------- Post & cable fence.

---------- Road.

---------- Concrete or cinder block retaining wall.

---------- Timber retaining wall.

---------- Sign.

---------- Existing grass

N21,500.00

---------- Radio-Isotope area

---------- Landscaping under contract

---------- Proposed grassing

---------- Road shoulder

---------- Ditch

---------- Existing bituminous surface.

---------- Barricade

---- Completed Scarifying

N21,000.00

DUST 603 CONTROL

BUILDINGS & ROADS

JULY 1, 1948

MONSANTO CHEMICAL COMPANY

CLINTON LABORATORIES

KNOXVILLE TENNESSEE.

V. NO.	REVISIONS	APPROVED BY DATE
9	Revised to July 1, 1948	
	Per Letter Instructions Of Lot 1616	

CLASSIFIED

For: H. T. Bray, Supervisor
Laboratory Records Dept.
ORNL

REFERENCE DRAWINGS

PROJ. NO.	SCALE 1"=100'	DATE
DRAWN BY	RAT-JNG-EGT	9-1-45
CHECKED BY	JWH-EGT	10-1-45
APPROVED BY		10-5-45
APPROVED BY		
APPROVED BY	PROJ ENGR.	10-5-45

DWG. NO. E-542A

E 32,500.00

N

CEW
Meridian

N23,500.00

E 33,000.00

N23,000.00

606 B

N22,500.00

NOTE:
Roads and areas shaded shall have 1½" plant mixed asphalt suface after scarifying and resurfacing.

N22,000.00

LEGEND

717 BB
706 C
706 D
706 C
707E
12'
24'
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717P
601C
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706A
502-1
706 AC
706 AD
12'
706 AB
726
713Q
713M
706F
706AE
625B
24'
706HB
Pond
206
713 UA
706HC
12'
Pond
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206A
CREEK
WHITE OAK
710A
626 A
701 DD
THIS DRAWING CLASSIF
PER
CHM
E32,000.00
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E 32,000.00

ROAD

24

501 C

501 D

24'

706 G

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STACK

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713 W

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101D

713 Y

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701K

24'

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502-3A

706 BA

717Q

502-3

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24

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717 BB

706 C

706 D

706 CA

707E

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601C

706 AC

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706 AD

719 A
717 C
801A
Tank Farm Area 206
604
710B
707 B
717 J
717 A
717 K
717 B
701 B
717 BA
502-7
703 B
717-1
713 B
735A
713A
713-0
713 R
713 E
717U
723
713 C
713 G
713 GA
713 F
717F
801 D
725
725A
Pond 206
717EC
717 G
713V
724
717 E
725B
725C
717 L
713S
717ED
717EE
717 H
717R
725D
717 EG
717N
717EB
717EA
713H
606 A
626 B
206A
1" Crown
2" Crown
3' Min. Shoulder Slope 2%
Existing Surface
AL SECTION
E 30,000.00
E 30,500.00
E 31,000.00

E 30,000.00

E 30,500.00

BETHEL VALLEY

J. A. JONES CO. AREA

501E

101D

104B

701F

815

726A

502-6

713AE

104A

717DA

706BB

706B4

706B

105E

717T

719B

706-1

706-IA

502-5

704A

707C

701C

717EF

714B

802

812

813

501B

811

735B

719AB

502-8

719A

708

713AF

801AB

717C

801A

Tank Farm Area 206

707A

707B

710B

717J

717A

717K

717B

701B

717BA

502-7

703B

717-1

713B

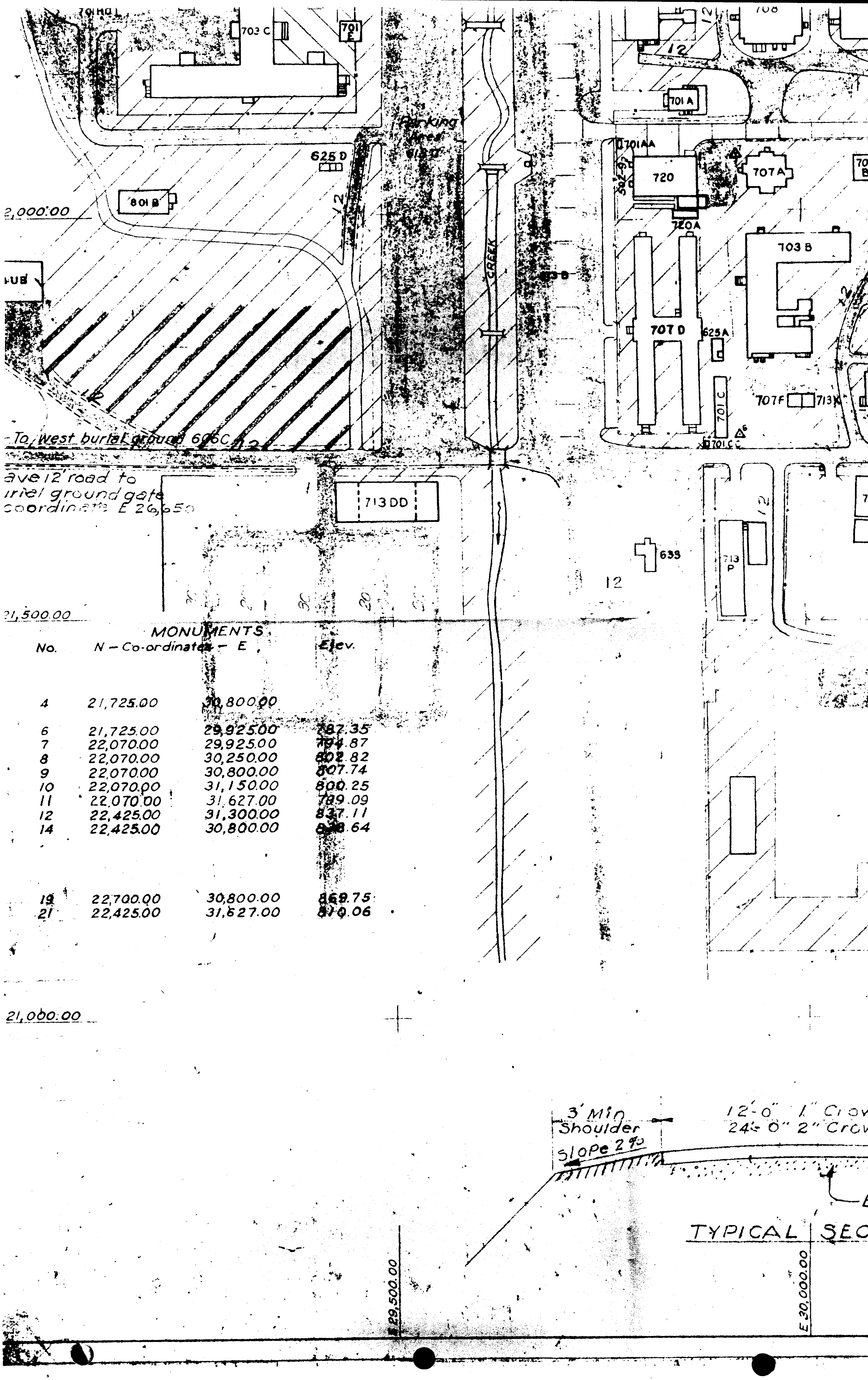
735A

713A

713-0

12'

24'



MONUMENTS

No.	N – Co-ordinates	– E	Elev.
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6	21,725.00	29,925.00	787.35
7	22,070.00	29,925.00	794.87
8	22,070.00	30,250.00	802.82
9	22,070.00	30,800.00	807.74
10	22,070.00	31,150.00	800.25
11	22,070.00	31,627.00	789.09
12	22,425.00	31,300.00	837.11
14	22,425.00	30,800.00	8[illegible].64
19	22,700.00	30,800.00	869.75
21	22,425.00	31,627.00	810.06

E 29,500.00

E 30,000.00

733

713 J

614-5

104 A

703 A Annex

706-1

706-IA

719 B

613 A

Parking Area

715

703 A

708

701 A

701 AA

720

707 A

707 B

720 A

703 B

707 D

625 A

701 E

703 C

701 D

625 D

601 B

CREEK

12'

[redacted]

OAK RIDGE NATIONAL LABORATORY
CENTRAL FILES NUMBER
48-10-220

C. 7.

Date October 25, 1948

File

Subject: Fifth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

Those Eligible to Read the Attached

To: C. N. Rucker

Copy # 27

From: Stuart McLain

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Technical Information Officer ORNL Site — Date 5/29/95

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[redacted]

This document consists of 7 pages. No. 27 of 34 copies. Series A.

To: C. N. Rucker

From: Stuart McLain

Subject: Fifth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

This memorandum summarizes the work accomplished during the past week on the waste disposal work of the Laboratory. The fourth weekly report was dated October 18, 1948, Central Files 48-10-236.

1. Solid Particles in Pile Cooling Air

The construction of the building for removal of particles by filters from the exit pile cooling air has progressed according to schedule. All the sidewalls have been poured and much of the excavating and forms for the ductwork have been completed. Photographs attached show the present status of the building construction. The connections to the present duct work will be made November 8th to 10th and the building will be placed in operation November 11th. The construction schedule has been set to permit adequate setting of the concrete.

The Chemical Warfare Service has stated that sample filters were tested under static conditions and the results obtained indicate that a temperature of 160°F is the maximum that they will stand without showing some detrimental effect. Calculations already made have demonstrated the feasibility of maintaining 160°F as a maximum temperature by cooling the exit air with water sprays. This will result in a loss in efficiency of the fans of less than three per cent.

Favorable designs of electrostatic precipitation equipment have been suggested by the Trion Company, Koppers Company, and Western Precipitation Company.

The exit pile cooling air will leave deposits on the FG50 and CWS #6 filters which will cause pressure increases and ultimately require changing the filters. It has been impracticable to date to obtain data to permit an intelligent cost balance of filter cost versus electrostatic precipitator costs. It is now planned to withhold a final decision on the purchase of electrostatic precipitators until some pressure drop data are obtained and a reliable cost analysis can be made.

2. Pile Operation

The pile was shut down on October 16th to permit data on area decontamination to be obtained. It was started up on October 21st. No slug ruptures or difficulties were encountered.

Radiograph pictures of dust deposits on the ledges of the pile building indicated the presence of small quantities of active particles. The building is being given a complete cleaning at all accessible spots.

3. Particles from the Isotope Area

In last week's report it was stated that it had been decided to install temporary equipment to remove particles from the off-gas, vessel vents, and all ventilation air streams from the isotope area before another RaLa run is made. This decision has been reconsidered in view of the high estimated costs and the time required to make the installation.

As now planned filters will be placed in the off-gas and vessel vent air in the RaLa facilities, Building 706-D, on a temporary basis. At the same time design of permanent facilities will be carried out. It is expected that the permanent facilities will be designed and constructed within six months.

The next RaLa run has been scheduled to start about November 15, 1948. During this run all gas lines will be sampled to provide design data for the permanent decontamination facilities. The air flow through the cells has been reduced from about 15,000 CFM to about 2,500 CFM by sealing all possible ports.

4. Area Decontamination

Paving of roads and planting of grass is progressing rapidly.

In order to determine the relative level of radioactive particles due to the background the pile and all chemical operations were shut down on October 16th. The pile was restarted October 21st and the Redox columns on October 23rd. Processing of P^{32} and I^{131} was started on October 23rd.

The data obtained during the shutdown show practically no change in the level of airborne radioactive particles as compared with normal operation.

5. Slug Improvement

The experimental work on ten slugs with 0.038 inches diameter holes drilled through the aluminum cans has continued. The slugs have been heated 370 hours at 250°C (482°F) with air at 60 feet per second. One slug has expanded 1/4 inch in diameter. The other slugs have expanded lesser amounts down to practically zero expansion. No signs of splitting or rupturing have occurred.

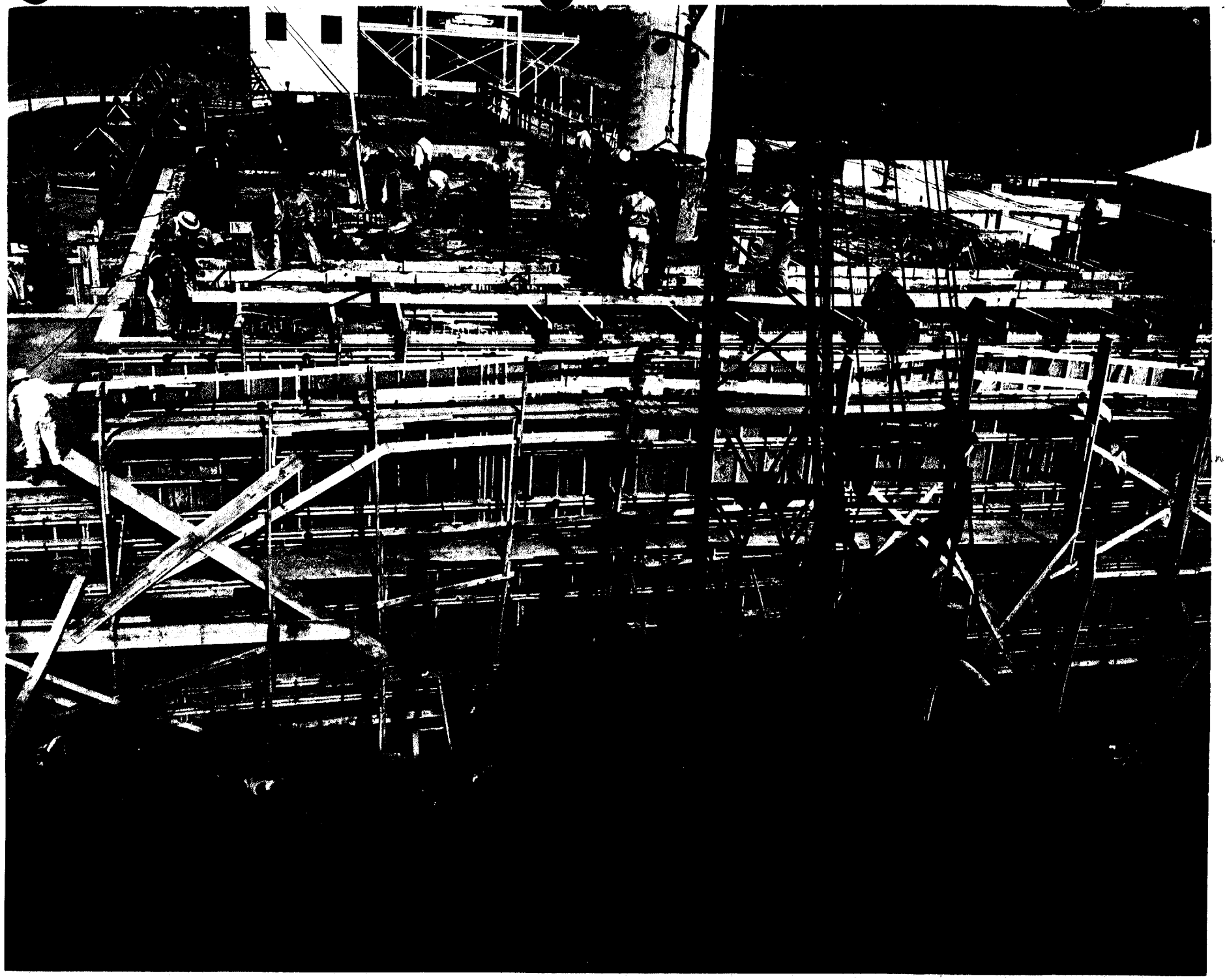
6. Solid Burials

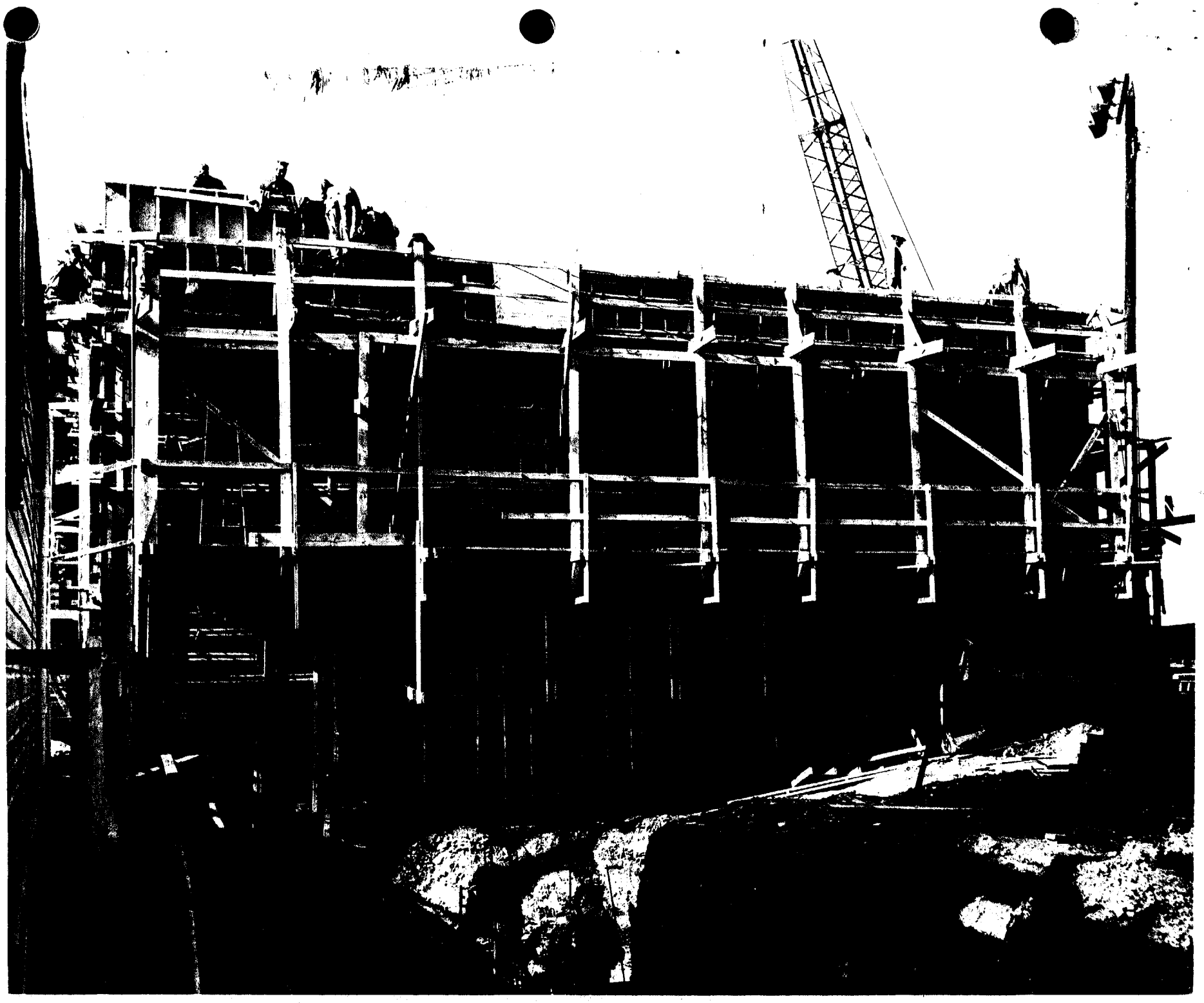
All beta-gamma burials of radioactive trash in the Burial Grounds are now being covered with an oil spray to reduce the dust hazard. The use of this spray will eliminate the necessity of covering each shipment with dirt and will thus make our space usage more economical.

Stuart McLain

Stuart McLain

SMcL/mmd
Encls.





[redacted]

OAK RIDGE NATIONAL LABORATORY
CENTRAL FILES NUMBER
48-11-17

Date November 1, 1948

File 2100

Subject: Sixth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

Those Eligible to Read the Attached

To: C. N. Rucker

Copy # 17

From: Stuart McLain

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Stuart McLain Nov 5th 1948

David R Hamman 2/6/85
Technical Information Officer
ORNL Site
Date

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4-15-59
DATE

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This document consists of 8 pages. No. 17 of 34 copies. Series A.

To: C. N. Rucker

From: Stuart McLain

Subject: Sixth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

This memorandum summarizes the work accomplished during the past week on the waste disposal work of the Laboratory. The fifth weekly report was dated October 25, 1948, Central Files 48-10-320.

1. Solid Particles in Pile Cooling Air

The construction of a building to house filters for cleaning the pile exit cooling air has progressed rapidly. The design is now complete and construction more than 80% complete. The building will be placed in operation November 11. Photographs attached show the status of the construction.

The preliminary design of a building to house the cyclones has been completed and the detailed design has been started by the Austin Company.

Pile exit cooling air has been run through a series of two layers of uncompressed American Air Filter Company's FG-50 filters followed by one layer of Chemical Warfare Service #6 filters for a period of seven days. The area of the experimental filters was one square foot with a flow of twenty feet per minute.

In the seven days there was no appreciable pressure buildup. The activity did not preceptably increase over that of the first hour's operation as measured externally by a Cutie Pie. Since the rate used in this experiment is almost double that expected in the full scale operation, the pressure buildup will be negligible in fourteen days operation and a reasonable filter life may be expected.

2. Pile Operation

The pile was operated without any slug ruptures or other difficulties during the past week. Due to the shutdown beginning October 16, it will be impossible to meet all isotope shipments. However, every effort is being made to fill as many orders as possible.

The RaLa run will be started about November 15. During this run tests will be made to measure the number of radioactive particles carried by the off-gas, vessel vent, and cell ventilation lines.

Data are being collected on the dissolver off-gas and vessel vent lines of the Pilot Plant, Building 205. One sample collected by a cyclone on the dissolver off-gas consisted mostly of HNO_3 with large quantities of dissolved NO_2. The activity was less than one mr/hr, the lower limit of the Cutie Pie used for the measurements.

A cyclone and a CWS #6 filter are installed in the vessel vent line. Activity is approximately zero as measured externally through the cyclone jar and stainless steel filter holder. However, when the paper was removed, it measured 80-100 mr/hr at several inches. When the filter is placed in a glass beaker very little activity penetrates the glass. Further data will be reported later.

3. Particles from the Isotope Area

Work on the preliminary design of a permanent filter building to handle the dissolver off-gas, process vessel vent gas, and cell ventilation air has progressed slowly. Studies and experiments are being conducted to reduce the amounts of cell ventilation air to a minimum before the design is fixed. It is hoped this preliminary work can be completed within the next few days.

As reported previously the next RaLa run is scheduled to start on November 15.

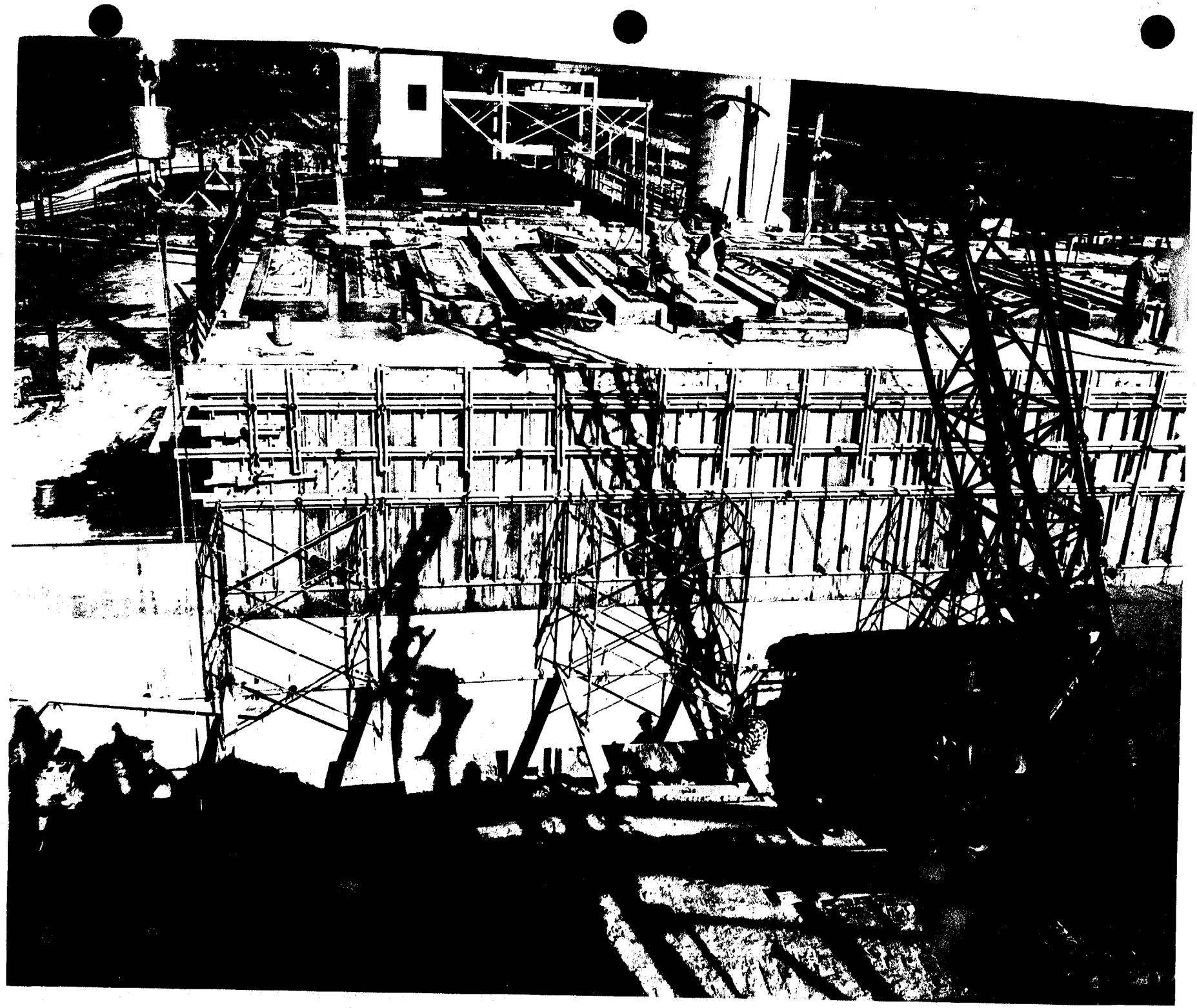
4. Area Decontamination

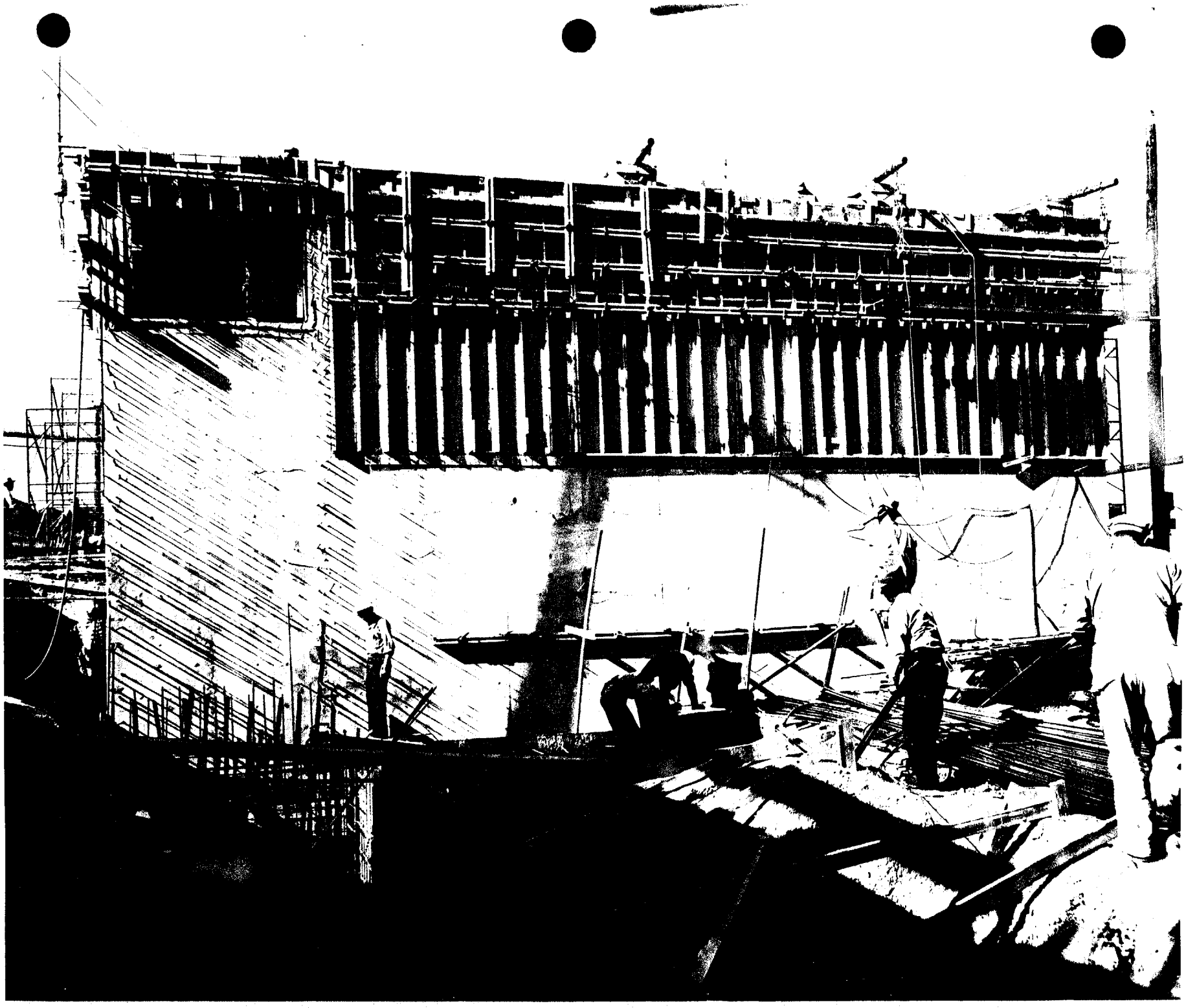
The grassing and seeding and paving are progressing rapidly. The grassing will be completed in about three weeks. The paving is about 25% complete. The map attached shows the locations and relative amounts of the work completed to date.

Stuart McLain

Stuart McLain

SMcL/mmd
Encls.





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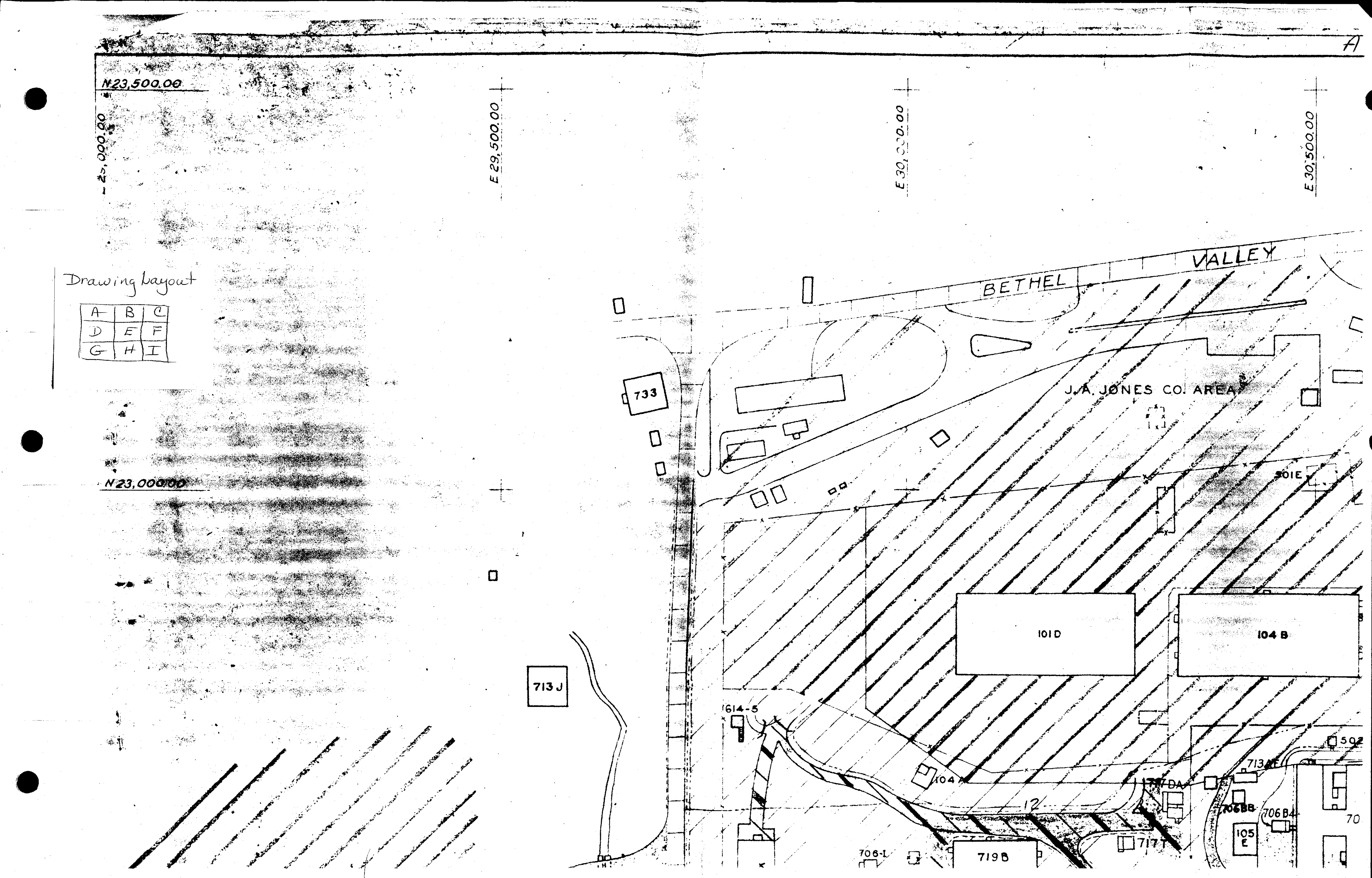

A
N23,500.00
N23,000.00
E 29,500.00
E 30,500.00
Drawing layout
A B C
D E F
G H I
BETHEL VALLEY
J.A. JONES CO. AREA
733
713 J
101 D
104 B
104 A
1614-5
12
719 B
717
105 E
706 BB
706 B4
713 AE
502
301 E
706-1
70

E 30,500.00

E 31,000.00

E 31,500.00

BETHEL VALLEY ROAD

J.A. JONES CO. AREA

501E

501C

501

24'

12'

101D

104B

701F

815

726A

706G

115

807

502-6

713E

713A

707DA

706BB

706B4

706B

105E

717

719B

704A

205

Stack

204

502-5

36'

713W

103

102

105

502

101

101B

101C

B101B

24

E 32,000.00

E 32,500.00

CEW. Meridian

N

E 33,000.00

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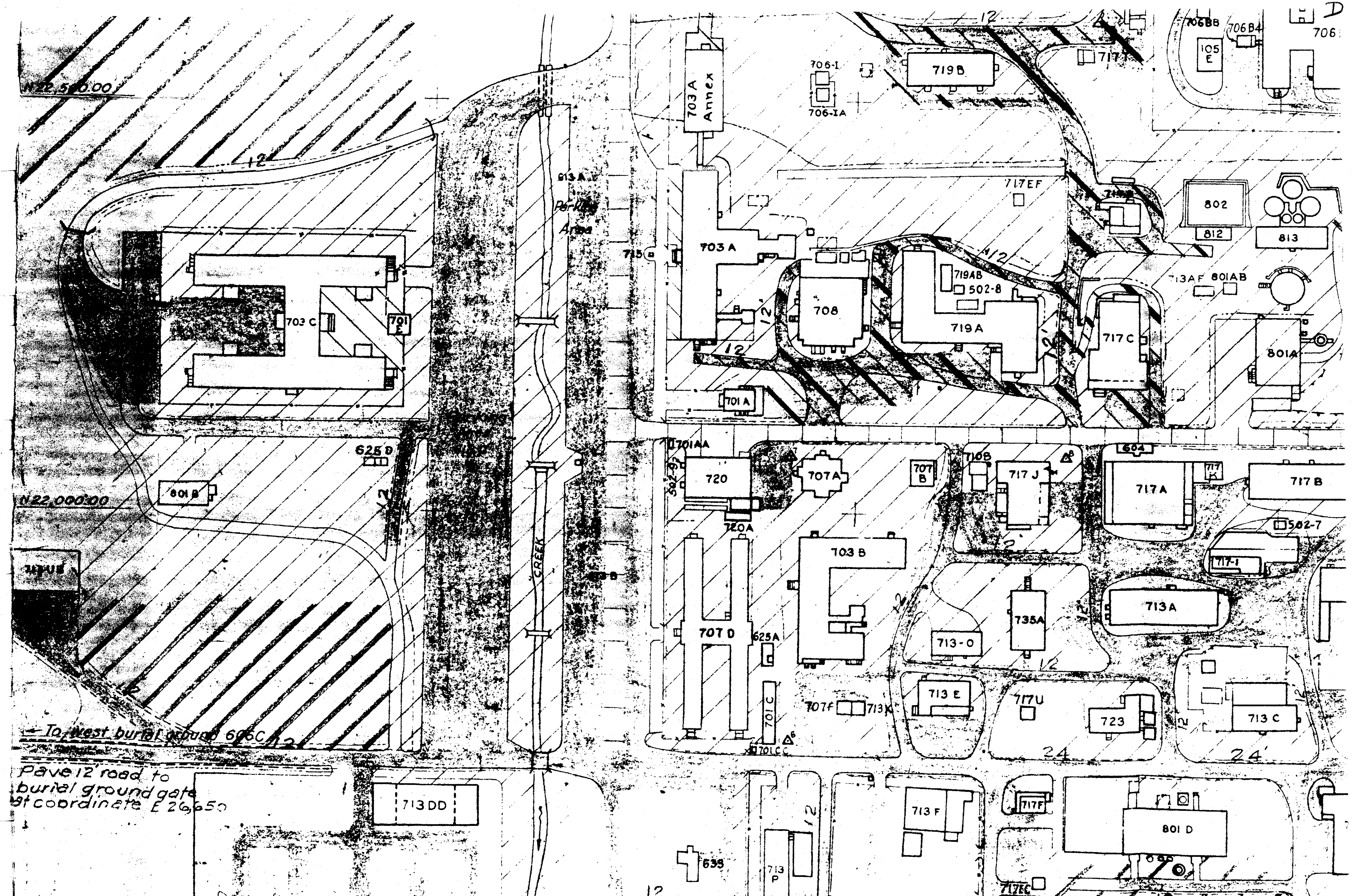
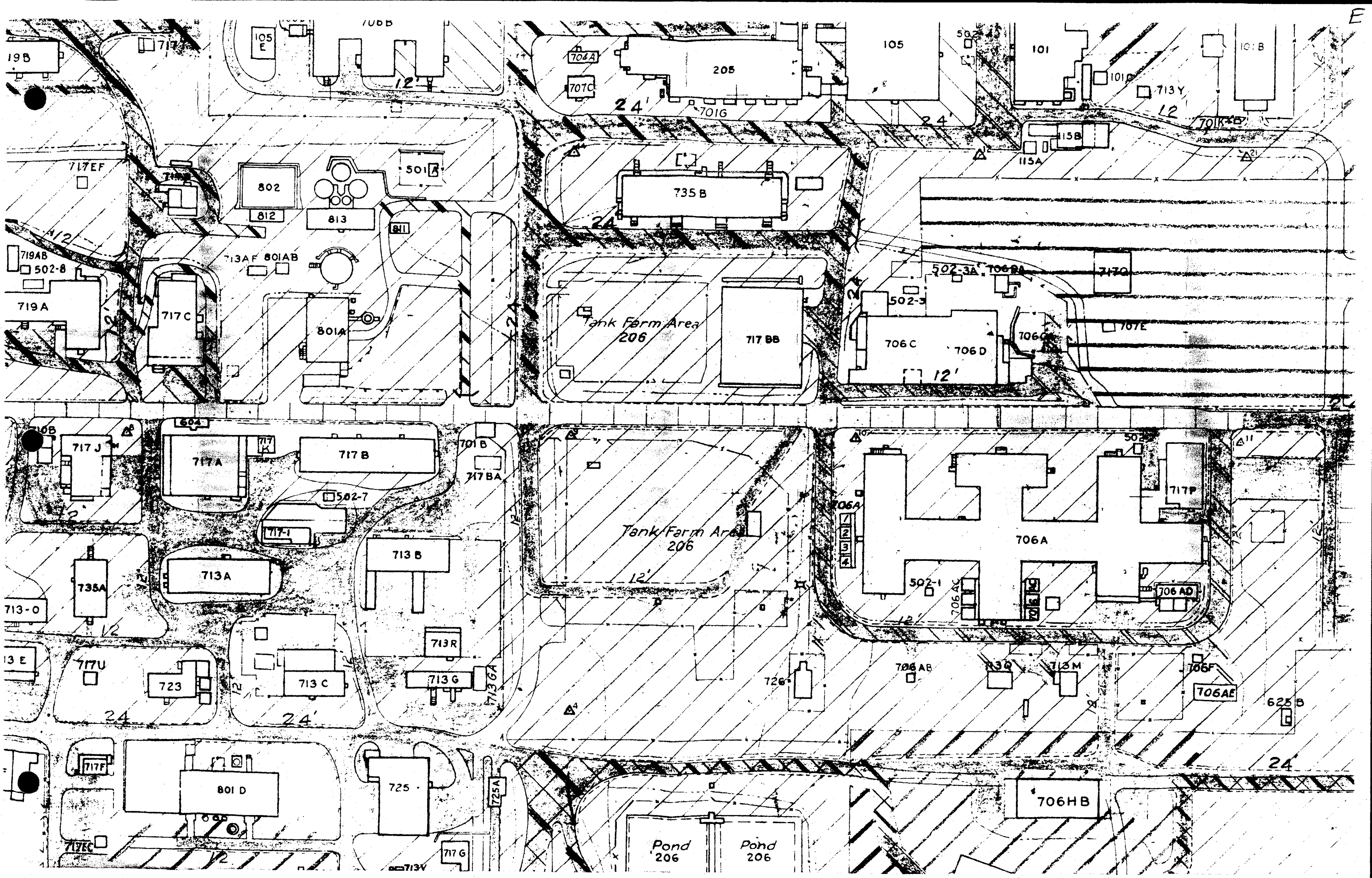


D
N22,500.00
N22,000.00
703 C
701 E
625 D
801 B
613 A
Parking Area
CREEK
703 A Annex
703 A
715
708
719 A
719 AB
502-8
717 EF
717 C
719 B
706-1
706-1A
706 BB
706 B4
706
105 E
802
812
813
713 AF
801 AB
801 A
701 A
701 AA
720
720 A
707 A
707 B
703 B
707 D
625 A
701 C
701 CC
707 f
713 K
710 B
717 J
717 A
717 B
604
502-7
717-1
713 A
735 A
713-0
713 E
717 U
723
713 C
713 DD
713 F
717 F
801 D
717 EC
713 P
635
To west burial ground 606C
Pave 12' road to
burial ground gate
at coordinate E 26,650



E
19B
717EF
719AB
502-8
719A
105 E
706B
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813
501A
811
713AF
801AB
717C
801A
706A
707C
205
701G
105
101
101B
101C
713Y
115B
115A
735B
Tank Farm Area 206
717BB
502-3A
706BA
717O
502-3
706C
706D
706G
707E
717J
604
717A
717K
717B
701B
717BA
502-7
717-1
713A
735A
713-0
713B
713R
713G
713GA
713C
723
717U
Tank Farm Area 206
706A
502-1
706AC
706AD
717P
706AB
713Q
713M
726
706F
706AE
625B
717F
801D
725
725A
717G
717EC
713Y
706HB
Pond 206
Pond 206

F

101 B

606 B

N22,500.00

NOTE:
Roads and areas shaded shall have 1½" plant mixed asphalt suface after scarifying and resurfacing.

12

24

24

601C

12

625 B

24

N22,000.00

LEGEND

729 ------ Building, steps & building number.

Δ6 ------ Monument.

50 E.S ------ Emergency generator & number.

------ Fence & gates.

------ Post & cable fence.

------ Road.

------ Concrete or cinder block retaining wall.

------ Timber retaining wall.

------ Sign.

N21,500.00

MONUMENTS

No.	N – Co-ordinates – E		Elev.
4	21,725.00	30,800.00	
6	21,725.00	29,925.00	787.35
7	22,070.00	29,925.00	794.87
8	22,070.00	30,250.00	802.82
9	22,070.00	30,800.00	807.74
10	22,070.00	31,150.00	800.25
11	22,070.00	31,627.00	799.09
12	22,425.00	31,300.00	837.11
14	22,425.00	30,800.00	828.64
19	22,700.00	30,800.00	869.75
21	22,425.00	31,627.00	870.06

N21,000.00

E 29,500.00

E 30,000.00

E 30,500.00

638

12

713 P

717EC

717 E

717 L

725C

725E

724B

713S

717ED

717EE

717 H

717R

725Q

717 EG

717N

717EB

717EA

713H

3' Min. Shoulder Slope 2%

12'-0" 1" Crown
24'-0" 2" Crown

3' Min. Shoulder Slope 2%

Existing Surface

TYPICAL SECTION

Pond 206

Pond 206

706HB

713 UA

706HC

717 G

713V

725C

724B

725E

713S

717EE

Pond 206

725G

717 EG

Pond 206

206A

CREEK

WHITE OAK

717EB

717EA

626 B

710A

626A

606A

701 DD

3' Min. Shoulder Slope 2%

face

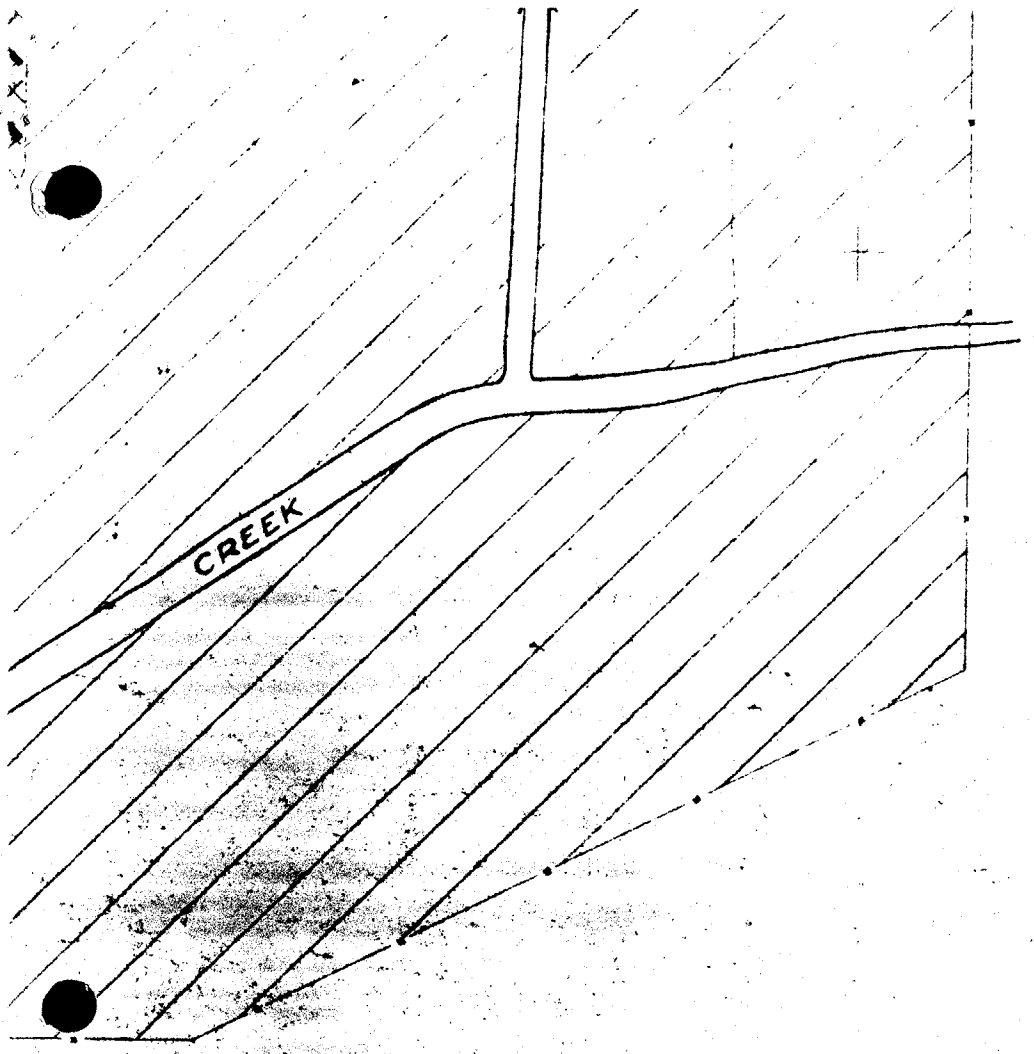
E 30,500.00

E 31,000.00

E 31,500.00

THIS DRAWIN

PER



E32,000.00

- Concrete or cinder block retaining wall.
- Timber retaining wall.
- Sign.

Existing grass

Radio-isotope area

Landscaping under contract

Proposed grassing

Road shoulder

Ditch

Existing bituminous surface

Barricade

Completed Scarifying Only

Completed One Surface Treatment Only

Completed Surface Treatment

N21,500.00

N21,000.00

DUST 603 CONTROL
BUILDINGS & ROADS
JULY 1, 1948

MONSANTO CHEMICAL COMPANY
CLINTON LABORATORIES
KNOXVILLE TENNESSEE.

THIS DRAWING CLASSIFIED AS:- [redacted]

PER C.M. Marsh

REV. NO.	REVISIONS	APPROVED BY DATE
9	Revised to July 1, 1948	

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OAK RIDGE NATIONAL LABORATORY
CENTRAL FILES NUMBER
48-11- 108

File Radiation Hazards
Waste Disposal
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Date November 8, 1948

Subject: Seventh Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

To: C. N. Rucker

From: Stuart McLain

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TRANSMITTAL DATED 11-29-48

11-33

To: C. N. Rucker

From: Stuart McLain

Subject: Seventh Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

This memorandum summarizes the work accomplished during the past week on the waste disposal work of the Laboratory. The sixth weekly report was dated November 1, 1948, Central Files 48-11-17.

1. Solid Particles in Pile Cooling Air

The construction of the building to house filters to clean the pile exit cooling air has progressed satisfactorily. Construction is 90% complete. The tie in to the air ducts will be made next week and the filters placed in operation on November 11. Photographs of the building are attached.

The layout for the building to house the cyclones has been completed and detailed design will start in a few days.

2. Particles from the Isotope Area

Work has continued on the study of the reduction in air flow from the isotope and pilot plant areas. The next RaLa run will be made with the cell ventilation air reduced to 2500 CFM. If this proves satisfactory, this will be set as the air volume to be used in the future. Further, if 2500 CFM is satisfactory, it is feasible to install temporary filters in this air line before any further RaLa runs are made. Design of a permanent filter building will be expedited as soon as all information can be obtained.

3. Area Decontamination

Grassing and seeding of the bare areas of the laboratory has been curtailed during the past week due to considerable rain. It is expected that the larger areas will be completed in about three weeks while some of the small areas near paving, etc., will take several weeks to complete.

The paving has been about 25% completed. The map attached indicates the progress of this work.

4. Pile Operation

The pile has been operated without any special incidents occurring during the past week. It will be shut down for three or four days next week while the tie in to the filter building is made.

Slug Improvement

Effort is being directed at obtaining information about the cause of blistering of slugs used in Oak Ridge National Laboratory Pile. Experiments of the following types are being carried out:

a. Heating of standard Oak Ridge slugs at various elevated temperatures, i.e., 250, 350, 450 and 550°C (482, 662, 842, and 1022°F) and noting the types of rupture, frequency and severity of blisters, nature of reaction zones at interface of slug and can and microstructural analysis of can and slug.

b. Removal of gases from slugs by heating in vacua followed by recanning and thermal testing as in a.

c. Coating of slugs with layers of materials that may retard or prevent interdiffusion of U and Al. The coated slugs are recanned and tested as in a. Al-Si eutectic alloy is being actively tested at present but other coatings on slugs or cans are being considered.

On the basis of rather inconclusive evidence, the following highly tentative conclusiions may be made:

a. Heating of Oak Ridge slugs to temperatures of 350°C and higher produces interaction of can and slug resulting in blisters on the cans. The inner surface of these blisters contains a layer of brittle material identified as UAl_3 compound. The UAl_3 compound layer in large blisters is in intimate contact with the Al can but is separated from the uranium surface by a void. The driving force which causes the Al can and compound layer to be raised up into a blister with consequent separation from the uranium surface has not yet been determined but it is thought possible that release of gas from the uranium metal at elevated temperatures may be responsible.

b. Intimate contact of can and slug while heated at elevated temperature is necessary for blister formation. This observation lends some hope to the thought that interference layers, such as anodized coatings on the can wall, will prevent blister formation.

c. Two distinct types of ruptures appear in Oak Ridge slugs heated in the range of 450°C to 550°C. These may be described as follows:

(1) One or two large blisters form quickly, the can ends are blown out, apparently by gas pressure, and rupture occurs at one of the blisters in a relatively short time period.

(2) Many blisters form on the slug and reach maximum size within a very short period, i.e., 6 to 12 hours. After an extended period of time, i.e. 5 to 10 days, rupture occurs at one of the blisters.

In the case of (1), it is felt that rupture is a direct result of gas pressure. The point of rupture shows no evidence of UAl_3 compound formation. In the case of (2), it is thought that the gradual reduction in thickness of the can wall by formation of UAl_3 produces failure by rupture.

d. On the basis of a relatively small number of tests, it would appear that Class 2 Oak Ridge slugs when heated to temperatures of 450°C to 550°C show considerably more instances of cans being bulged out by gas pressure within the can than do Class 1 slugs. This bulging is similar to the type (1) failure outlined above but to date has not yet resulted in rupture of any cans.

It is emphasized that the above is merely an iterim progress report and the above tentative conclusions are based on a relatively small amount of data. Considerable further work is needed to substantiate these findings.

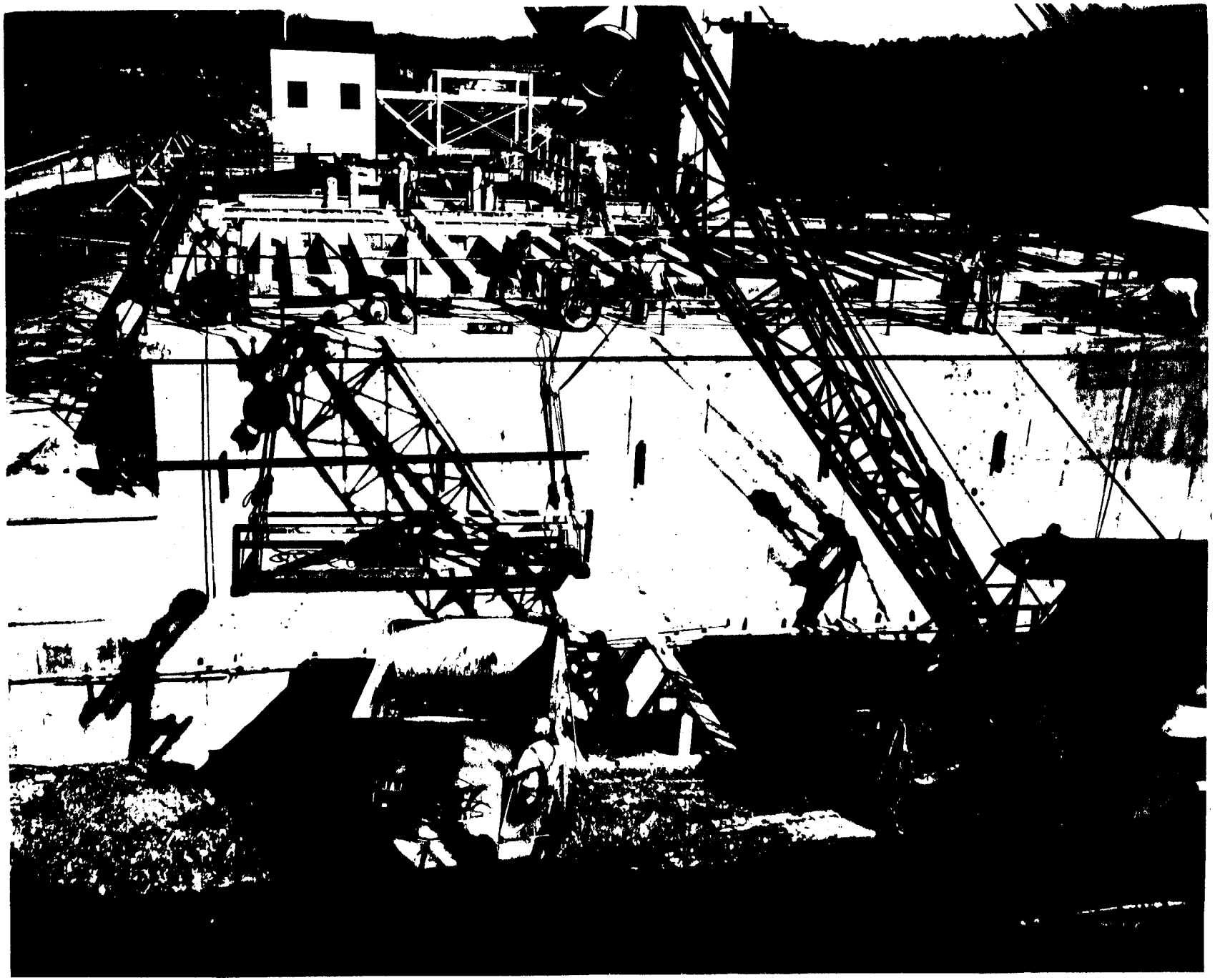
The experimental test on ten slugs with .038 inches diameter holes drilled through the aluminum cans has continued. The slugs have been heated over 500 hours at 250°C with air at 60 feet per second. The slugs have continued to swell and the swelling can easily be detected by change in air flow. No failures have occurred.

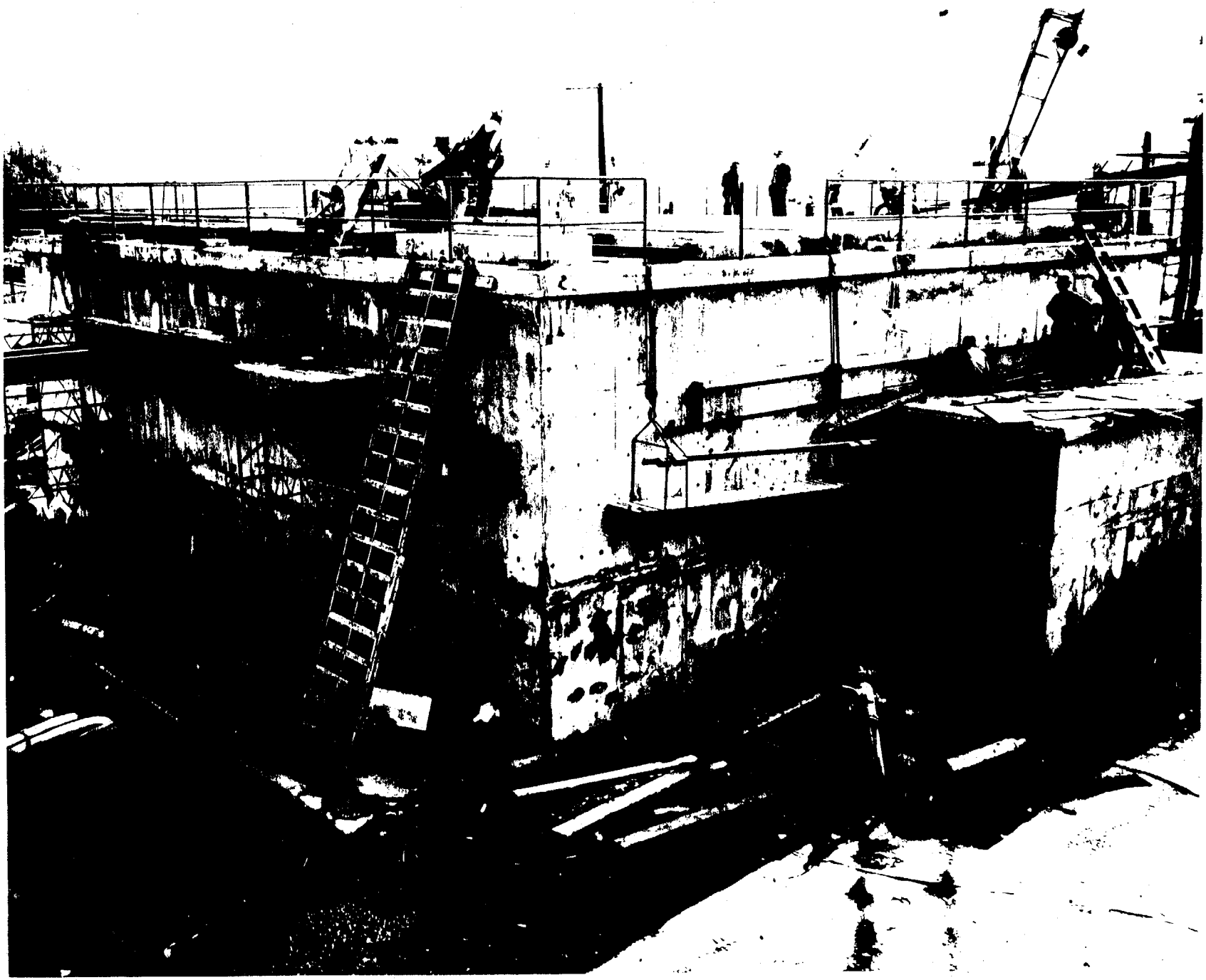
Stuart McLain

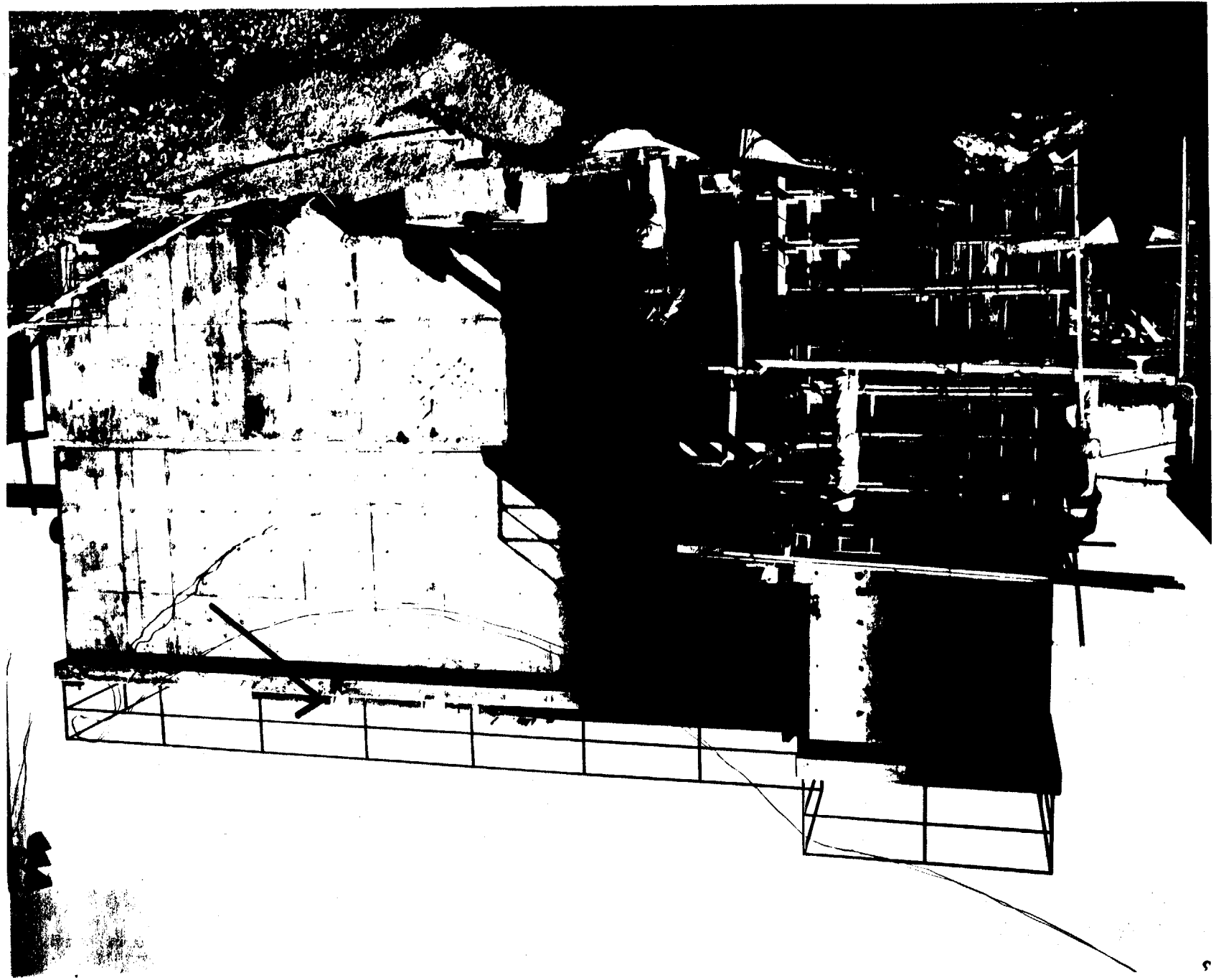
Stuart McLain

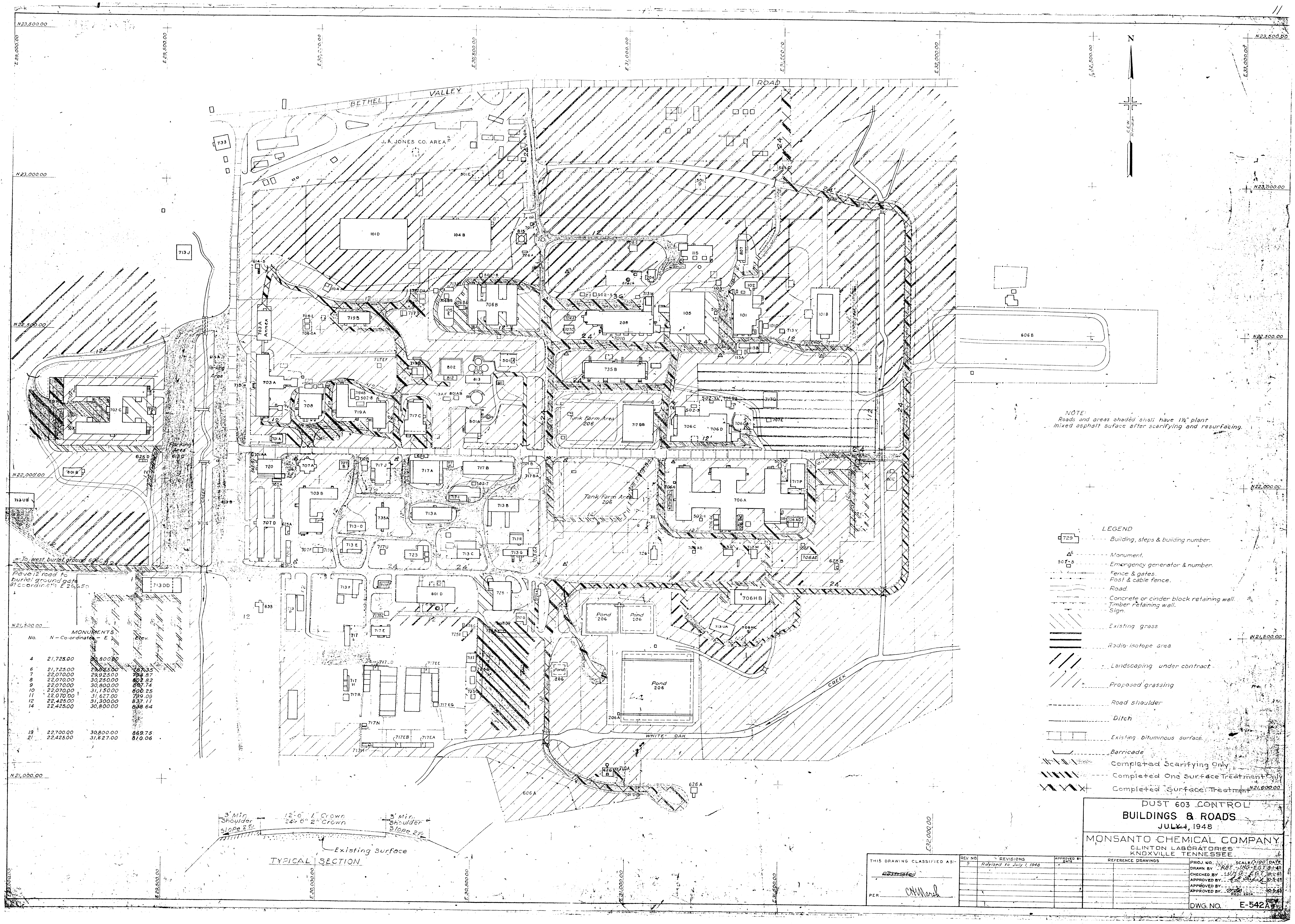
SMcL:eg

[redacted]








N
BETHEL VALLEY ROAD
J. A. JONES CO. AREA
NOTE: Roads and areas shaded shall have 1½" plant mixed asphalt suface after scarifying and resurfacing.
Tank Farm Area 206
Pond 206
WHITE OAK CREEK
Parking Area
To west burial ground 606C
Pave 12' road to burial ground gate at coordinate E 26,650
MONUMENTS
No. N - Co-ordinates - E Elev.
4 21,725.00 30,800.00
6 21,725.00 29,925.00 787.35
7 22,070.00 29,925.00 794.87
8 22,070.00 30,250.00 802.82
9 22,070.00 30,800.00 807.74
10 22,070.00 31,150.00 800.25
11 22,070.00 31,627.00 799.09
12 22,425.00 31,300.00 837.11
14 22,425.00 30,800.00 838.64
19 22,700.00 30,800.00 869.75
21 22,425.00 31,627.00 810.06
3' Min. Shoulder Slope 2%
12'-0" 1" Crown
24'-0" 2" Crown
3' Min. Shoulder Slope 2%
Existing Surface
TYPICAL SECTION
LEGEND
Building, steps & building number.
Monument.
Emergency generator & number.
Fence & gates.
Post & cable fence.
Road.
Concrete or cinder block retaining wall.
Timber retaining wall.
Sign.
Existing grass
Radio-isotope area
Landscaping under contract
Proposed grassing
Road shoulder
Ditch
Existing bituminous surface.
Barricade
Completed Scarifying Only
Completed One Surface Treatment Only
Completed Surface Treatment
DUST 603 CONTROL
BUILDINGS & ROADS
JULY 1, 1948
MONSANTO CHEMICAL COMPANY
CLINTON LABORATORIES
KNOXVILLE TENNESSEE.
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9 Revised to July 1, 1948
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APPROVED BY PROJ. ENGR. 10-5-45
DWG. NO. E-542A REV 9

#1324

[redacted]

OAK RIDGE NATIONAL LABORATORY
CENTRAL FILES NUMBER
48-11- 163

Date: November 15, 1948

Subject: Eighth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

To: C. N. Rucker

From: Stuart McLain

File ~~Radiation Hazard~~ Waste Disposal

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W. H. Ray 11-18-48

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For E. T. Bray, Supervisor
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[redacted] data withi[redacted] Energ[redacted]tion affect[redacted] [redacted]ing of the [redacted] 32 a[redacted]or the reve[redacted] [redacted] is prohibit[redacted]l penalty.

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To: C. N. Rucker

From: Stuart McLain

Subject: Eighth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

This memorandum summarizes the work accomplished during the past week on the waste disposal work of the Laboratory. The seventh report was dated November 8, 1948, Central Files No. 48-11-108.

1. Solid Particles in Pile Cooling Air

The construction of the building to house the filters to clean the pile exit cooling air was 94% complete on November 11. Pile cooling air was started through the building November 14. Cleanup and construction of a by-pass remain to be completed. Photographs of the buiding are attached.

A decision was made to continue design on a building to house the cyclones, but any steps toward the actual construction is to be postponed until some operating experience is gained with the filter house.

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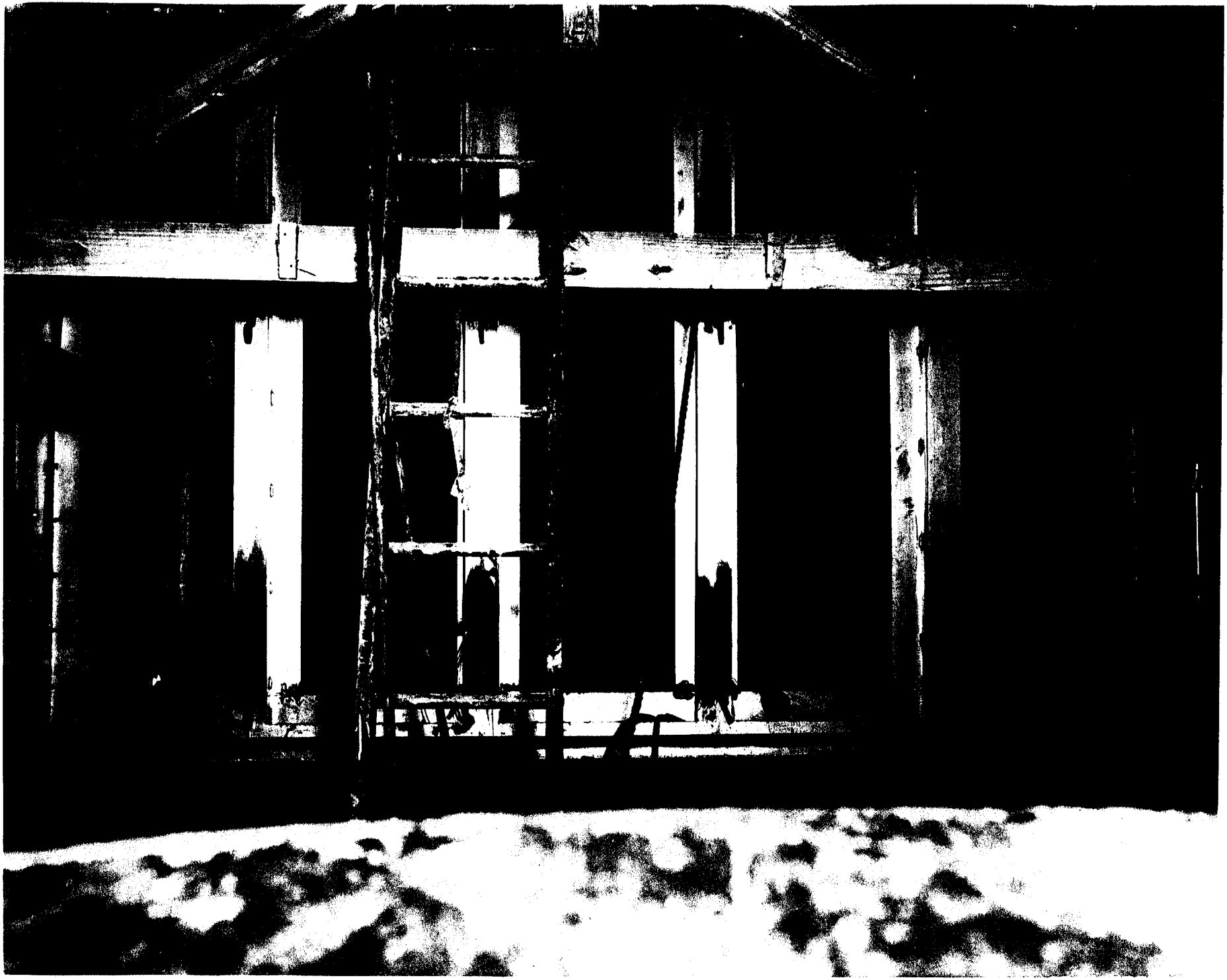
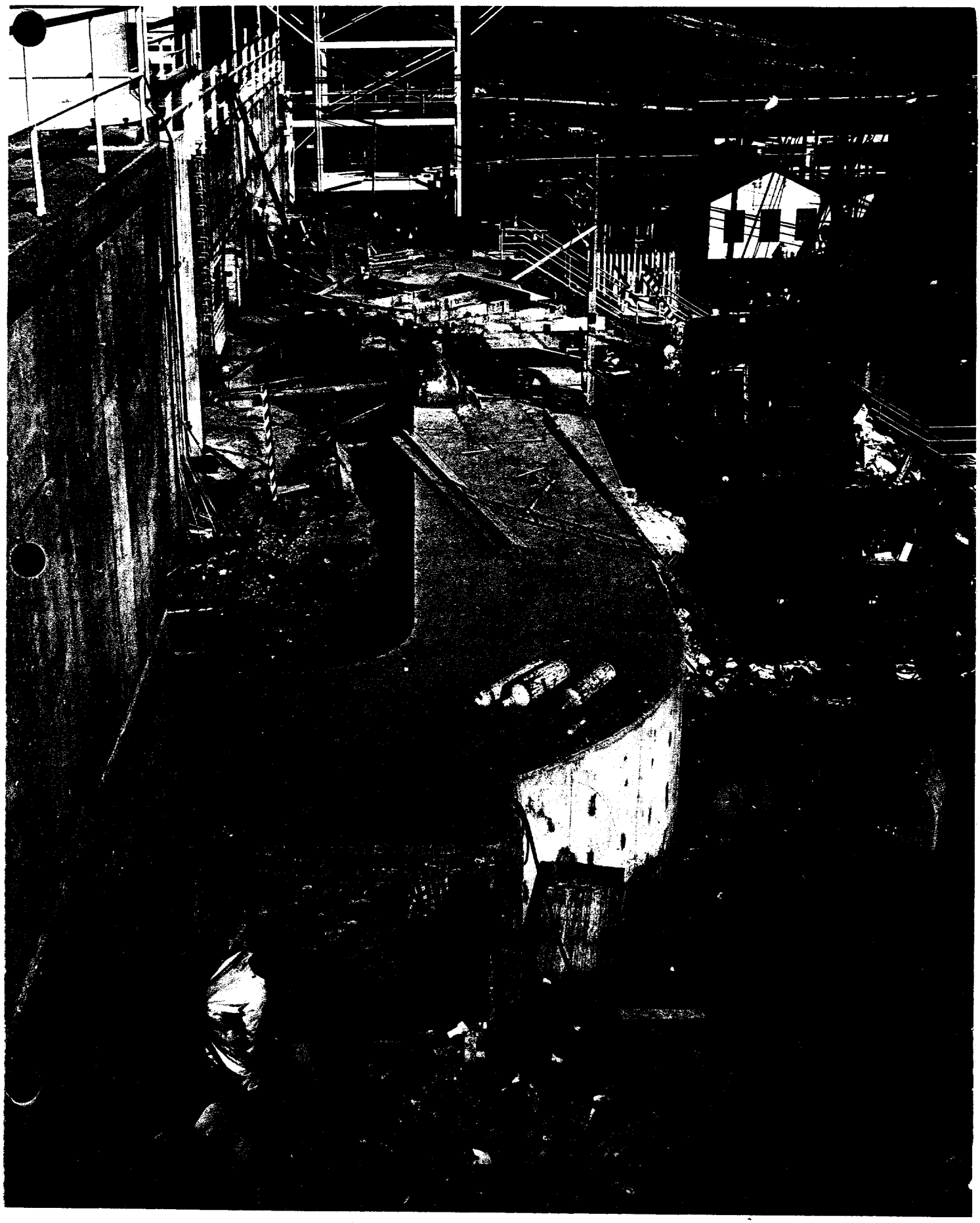
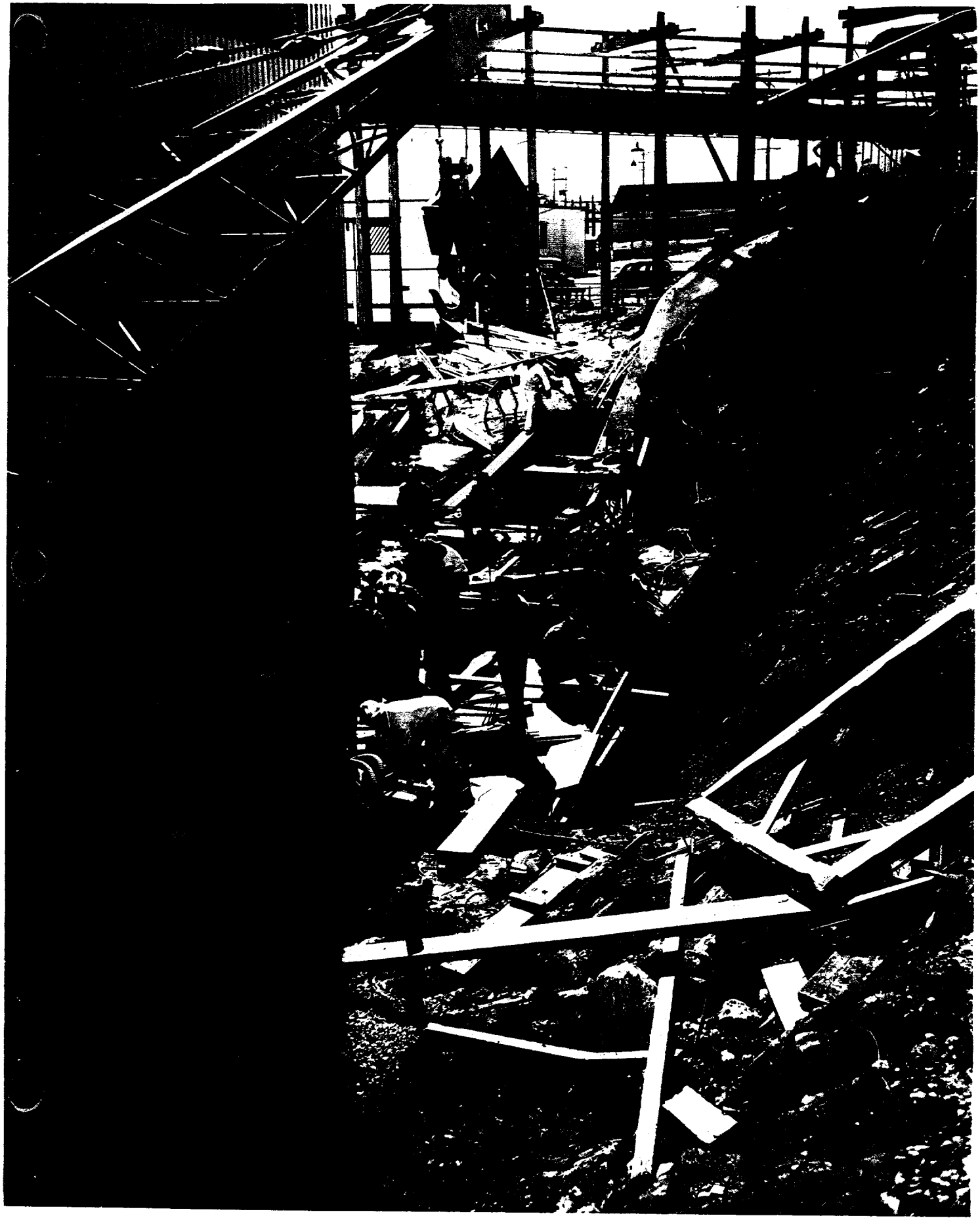
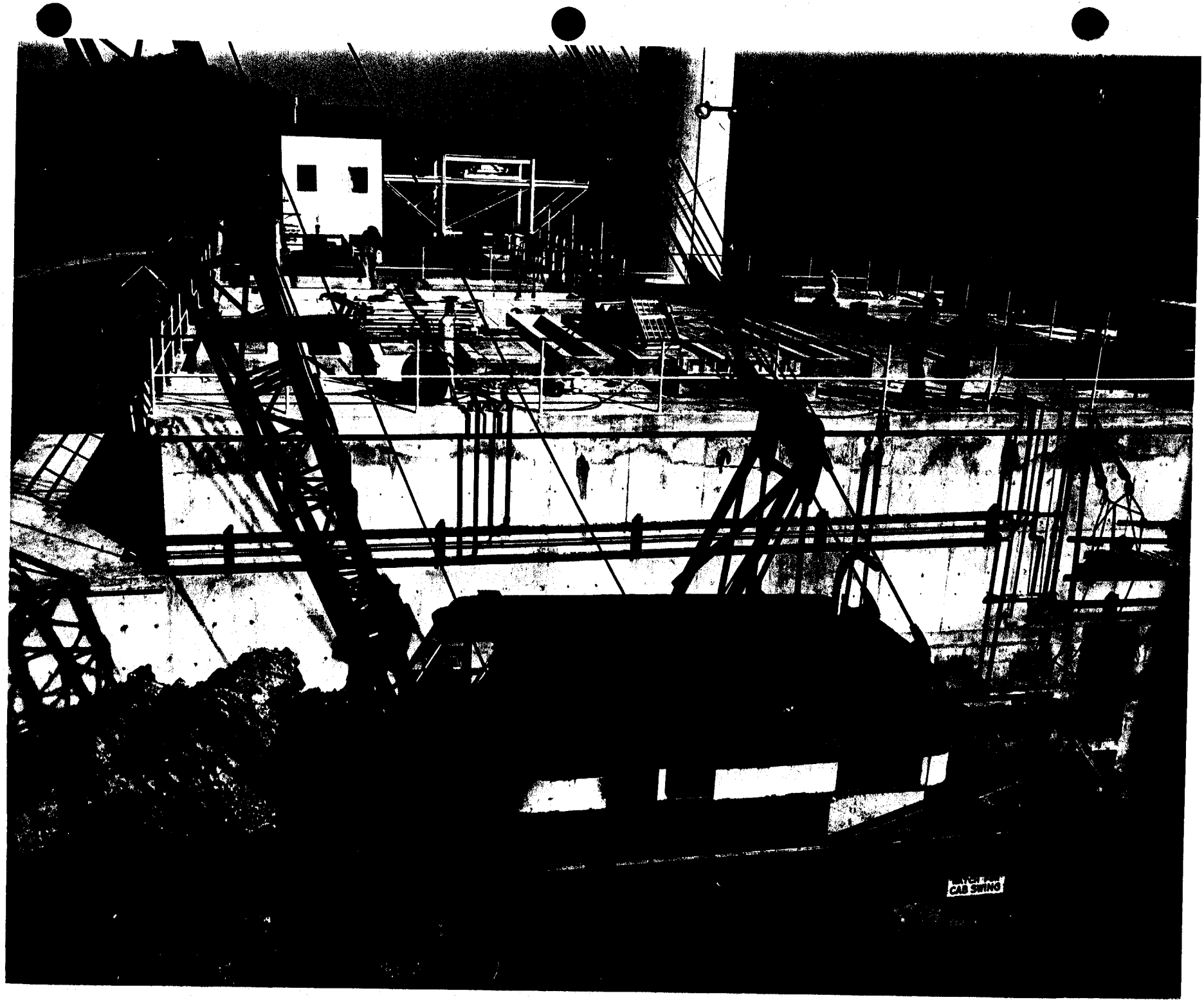
Stuart McLain

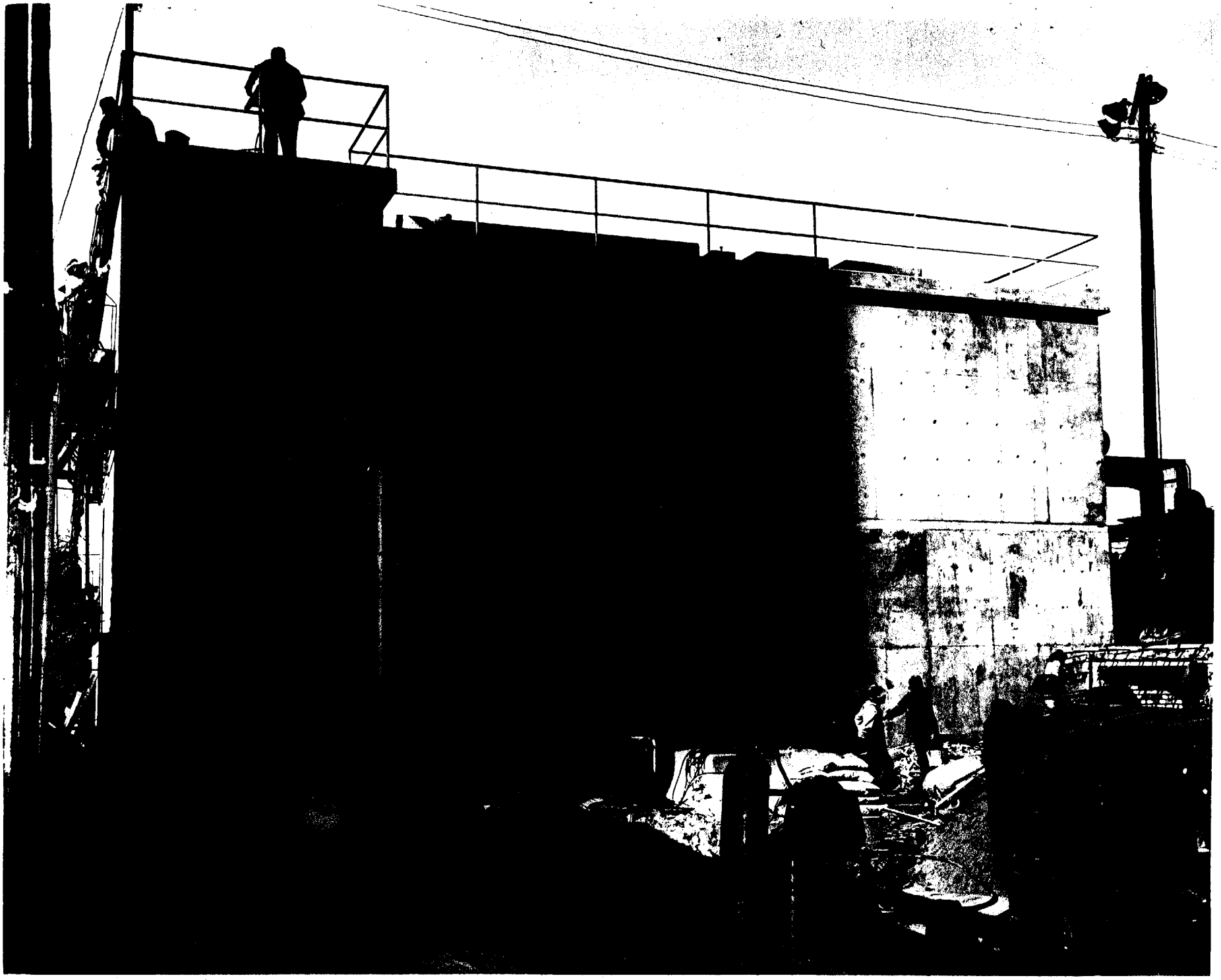
Stuart McLain








CAB SWING



Roads and areas shaded shall have 1½" plant mixed asphalt suface after scarifying and resurfacing.

N22,000.00

LEGEND

729 ------ Building, steps & building number.

△6 ------ Monument.

50 E-5 ------ Emergency generator & number.

------ Fence & gates.

------ Post & cable fence.

------ Road.

------ Concrete or cinder block retaining wall.

------ Timber retaining wall.

------ Sign.

------ Existing grass

N21,500.00

------ Radio-isotope area

------ Landscaping under contract

------ Proposed grassing

------ Road shoulder

------ Ditch

------ Existing bituminous surface.

------ Barricade

Completed Scarifying Only

---- Completed One Surface Treatment Only

Completed Surface Treatment

N21,000.00

DUST 603 CONTROL

BUILDINGS & ROADS

JULY 1, 1948

MONSANTO CHEMICAL COMPANY

CLINTON LABORATORIES

KNOXVILLE TENNESSEE.

NO.	REVISIONS	APPROVED BY DATE
9	Revised to July 1, 1948	T

REFERENCE DRAWINGS

PROJ. NO. SCALE 1/200 DATE

DRAWN BY RAT JAG EGT

CHECKED BY LJH GI EGT

APPROVED BY

APPROVED BY

APPROVED BY

DWG. NO. E-542

N

E 32,500.00

C E W. Meridian

N23,500.00

E 33,000.00'

N23,000.00

606 B

N22,500.00

NOTE:
Roads and areas shaded shell have 1½" plant mixed asphalt suface after scarifying and resurfacing.

N22,000.00

LEGEND

706C
706D
12'
706G
707E
24
706A
706A
717P
601C
502-1
706AC
706AD
706AB
713M
706F
706AE
625B
706HB
713UA
706HC
12'
24
Pond
206
CREEK
WHITE OAK
626A
£32,000.00
£31,500.00
THIS DRAWING CLASSIFIED AS:-
[redacted]
REF.

E31,500.00

E32,000

ROAD

24'

501 D

24'

115

807

204

103

102

713 W

105

50

101

101B

101C

713 Y

12

701K

24'

12

115B

115A

502-3A

706BA

717Q

502-3

706C

706D

706CA

707E

12'

BB

24

12

24

706A

1

2

3

4

502-1

706AC

706AD

717P

601C

12'

717 C
801A
Tank Farm Area 206
717 B
604
710B
707 B
717 J
717 A
717 K
717 B
701 B
717 BA
502-7
717-1
713 B
713 A
735A
713-0
713R
713 E
717U
723
713 C
713 G
713 GA
713 F
717F
801 D
725
725A
717EC
717 G
717 E
725C
725E
717 L
713S
717ED
717EE
Pond 206
717 H
717R
725 E
717 EG
717N
717EB
717EA
713H
206A
626 B
606 A
701 DD
Crown
Crown
3' Min. Shoulder Slope 2%
Existing Surface
SECTION
E 30,500.00
E 31,000.00

E 30,500.00

E 31,000.00

BETHEL VALLEY

J. A. JONES CO. AREA

101D

104 B

701F

815

726A

502-6

713AF

104A

707DA

706BB

706B4

706B

105 E

719B

717

502-5

704A

707C

205

7016

717EF

802

812

813

811

501B

735B

719AB

502-8

719A

717C

713AF 801AB

801A

Tank Farm Area 206

717

710B

707 B

717J

717A

717K

717B

701B

717BA

502-7

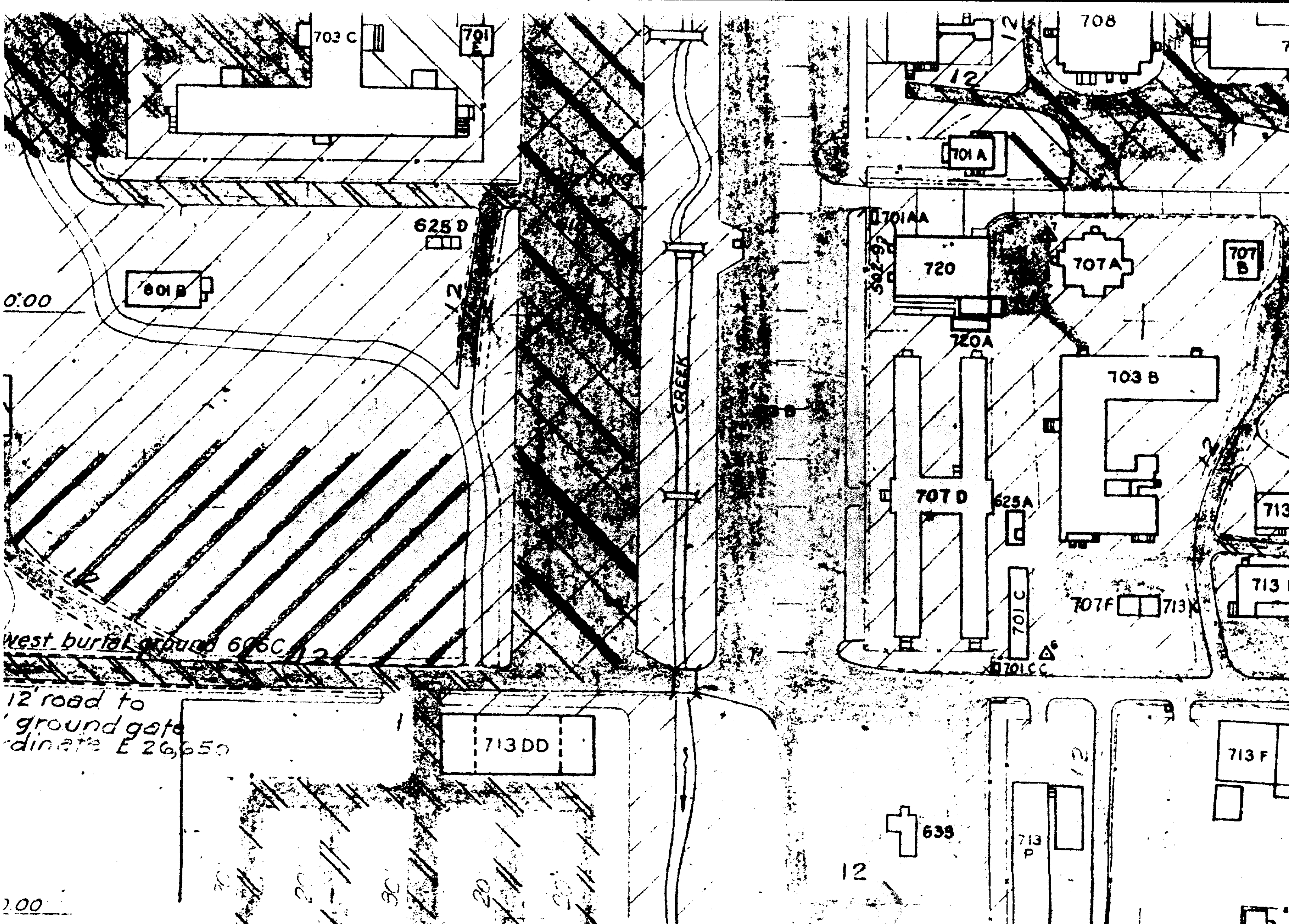
713B

713A

735A

713-0

Tank Farm Area 206



MONUMENTS

o.	N – Co-ordinate	– E	Elev.
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	22,070.00	29,925.00	794.87
	22,070.00	30,250.00	802.82
	22,070.00	30,800.00	807.74
0	22,070.00	31,150.00	800.25
1	22,070.00	31,627.00	799.09
2	22,425.00	31,300.00	837.11
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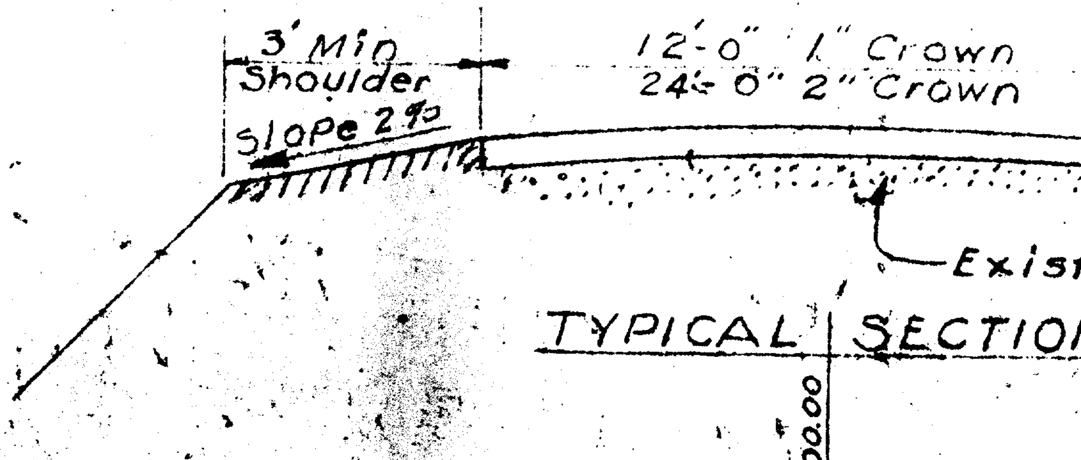
	22,425.00	31,627.00	810.06

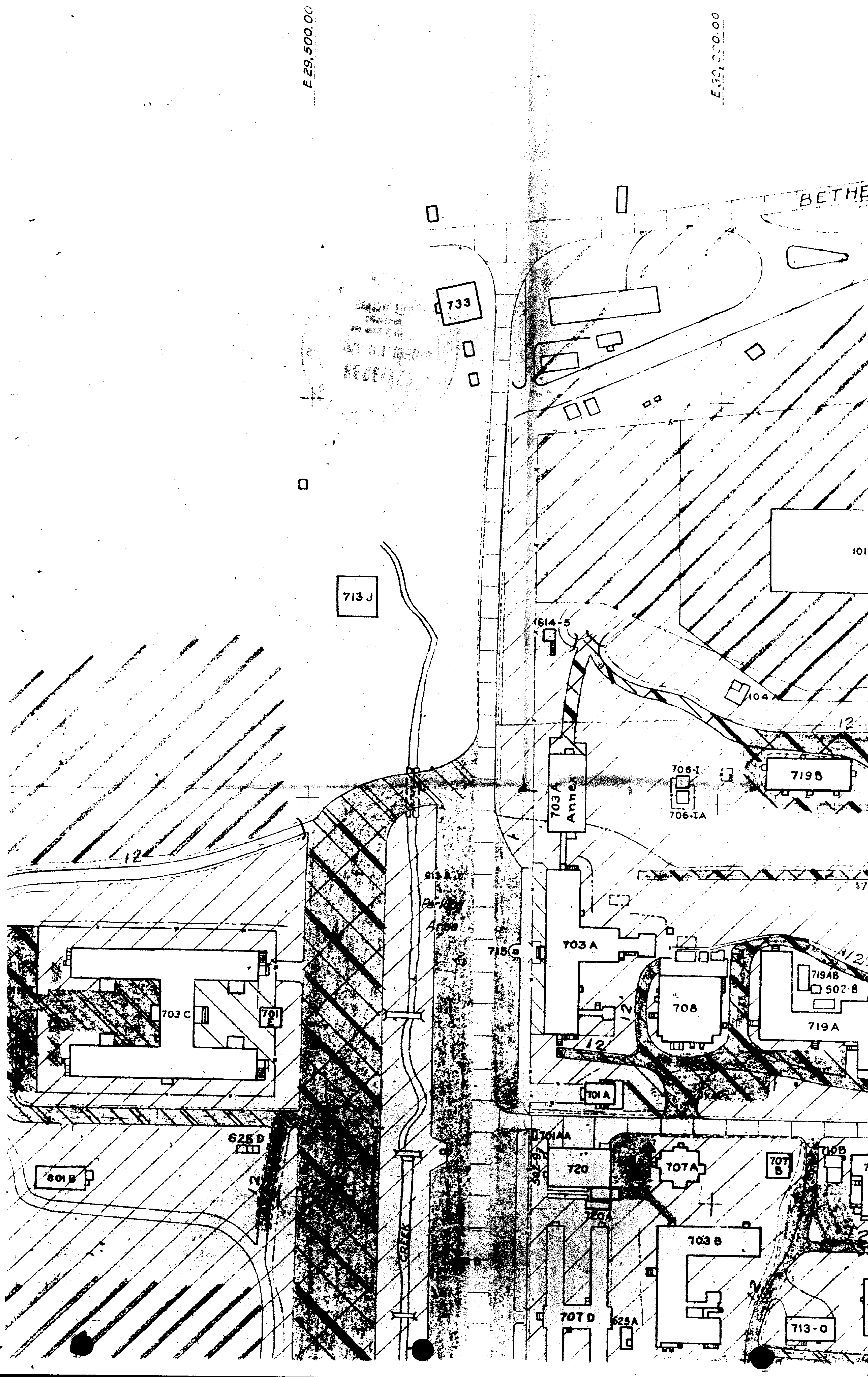
.00



TYPICAL SECTION

E 29,500.00

E 30,000.00


E 29,500.00
BETHE
733
713 J
101
1614-5
104 A
706-1
706-1A
719 B
703 A Annex
613 A
Parking Area
715
703 A
719AB
502-8
708
719 A
12
703 C
701 E
701 A
625 D
601 B
701AA
720
720A
707 A
707 B
710B
CREEK
703 B
707 D
625A
713-0

OAK RIDGE NATIONAL LABORATORY
CENTRAL FILES NUMBER
48-11-163

Date November 15, 1948 File

Subject: Eighth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

Those Eligible to Read the Attached

To: C. N. Rucker

From: Stuart McLain Copy # 19

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22. C. N. Rucker
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25. A. M. Weinberg
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30. Central Files
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OGR FILTER HOUSE

Ra La FILTERS

Redox and Iodine Ops Emission rates

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[redacted]

This document consists of 10 pages. No. 19 of 31 copies. Series A.

To: C. N. Rucker

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1. Solid Particles in Pile Cooling Air

The construction of the building to house the filters to clean the pile exit cooling air was 94% complete on November 11. Pile cooling air was started through the building November 14. Cleanup and construction of a by-pass remain to be completed. Photographs of the buiing are attached.

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It is of interest to note that the original statistical analysis of slug testing methods predicted very closely the slug ruptures observed to date.

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C. Cell Ventilation

The cell ventilating air along with air from several isotope manufacturing operations, several hot hoods in an analytical laboratory, iodine operations in 706-C, and the vessel vent line from the RaLa operations were collected together and sampled. Since RaLa was not in operation, little if any activity was caused by this source. The cyclone caught very little activity. The filter paper caught from zero to 750 microcuries of gamma and two to 3750 microcuries of beta activity per day. A large part of this activity occurred during a non-routine operation in the pilot plant. It is indicated that the normal activity in the hot pilot plant cell is relatively low.

D. 706-C Bldg. Slug Dissolver Line

Three days of sampling this off-gas gas yielded an average of one millicurie of gamma and four millicuries of beta activity per day. When multiplied by three these results will represent the contribution of one slug dissolving in C Building. It should be pointed out that this operation is not cintinuous, but occurs whenever the demand for radioiodine require operation of this facility.

5. Area Decontamination

The area grassing and seeding program is 80 to 85% complete. The paving program is 60% complete. The map attached indicates the areas already paved.

6. Slug Rupture Experiments

The synthetic slug rupture experiment has operated for another week. Three slugs, after swelling to about 1.5" in diameter, show evidences of splitting open. Heating will be continued until complete destruction occurs.

7. Microscopic Examination of Filter Media

Electron micrographs of American Air Filter FG50 media (Brown), CWS#6 filter paper, and Owens-Corning Fiberglass Experimental Glass Wool Filter (White) are shown in the attached Figures. From these figures one may expect that the CWS paper will be the most efficient particle collector. For absorption of particles less than one micron in diameter it is necessary

for the particles to come into contact with the surface of one of the fibers of the filter media or in contact with the surface of one particle already attached to the filter media by absorption, adsorption, or mechanical entrainment. This statement is based on Langmuir's theory on the mechanical filtration of aerosols and has been confirmed by experiment. Since, for particles only a few hundredths of a micron in diameter, Brownian movement is of importance, a filter media having a very large surface area and very small fiber diameters such as possessed by CWS #6 becomes very efficient as the particles have a very high probability of coming into contact with the filter media due to their movement within the air stream. Thus, we expect that the filters on the pile exit air remove almost all particles above one micron in diameter and almost all of the very small particles of a diameter up to .2 micron diameter. In the intermediate range of about .3 to .4 micron diameters some of the particles probably pass through the filter media.

The effect of the increased ionization due to the radioactivity present is entirely unknown. It may be that it is this particle size range of about .4 micron that is most hazardous from a health viewpoint. Dr. T.F. Hatch of the Industrial Hygiene Foundation of Pittsburgh, stated verbally in a conference on this problem that he believed this size range is the most likely to be hazardous.

Since so little is known at present concerning these problems, the installation of the electrostatic precipitators is being delayed until more research results are obtained. Meanwhile, measurements of the particles passed through the CWS #6 paper will be made to determine the efficiency of the filters in this size range. A comparision will be made between the filters and the impact tester.

Some references dealing with this subject are:

1. NDRC, Div. B, OSRD No. 865, Subject: Filtration of Aerosols and the Development of Filter Materials, W. H. Rodebush, I. Langmuir, & V. K. LaMer, dated 9-4-42.

2. NDRC, Div. 10, OSRD No. 3460, Subject: Smokes & Filters - Supplement to Sect. I, I. Langmuir & K. B. Blodgett, dated 4-12-44.

3. NRC (Canada), C.E. 42 (Edgewood Arsenal File No. ETF 550 Ca 661), Subject: Efficiency of Filters & Particle Size, E.F. Burton, et al, dated Nov., 1944.

4. EEICWST/NA-IR-6, Subject: German CW Preparations, Captain J. W. Gost, 7-12-44.

[redacted]

OAK RIDGE NATIONAL LABORATORY
CENTRAL FILES NUMBER
48-11- 163

Date November 15, 1948

File ~~Laboratory Wastes~~ Waste Disposal

Subject: Eighth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

Those Eligible to Read the Attached

To: G. N. Rucker

From: Stuart McLain

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W. H. Ray 11-18-48

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Per A. T. Bay, Supervisor
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ORNL

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5. [redacted]
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7. [redacted]
8. [redacted]
9. [redacted] Holland, Jr., AEC
10. [redacted] Holland, Jr., AEC
11. [redacted] Holland, Jr., AEC
12. [redacted]
13. [redacted], Argonne
14. [redacted], AEC
15. [redacted], AEC
16. [redacted]
17. George [redacted], Austin Co.
18. George [redacted], Austin Co.
19. K. [redacted]
20. M. [redacted]
21. W. [redacted]
22. G. [redacted]
23. S. [redacted], AEC
24. J. [redacted]
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11-34

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This document consists of 10 pages. No. 21 of 31 copies. Series A.

To: C. N. Rucker

From: Stuart McLain

Subject: Eighth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

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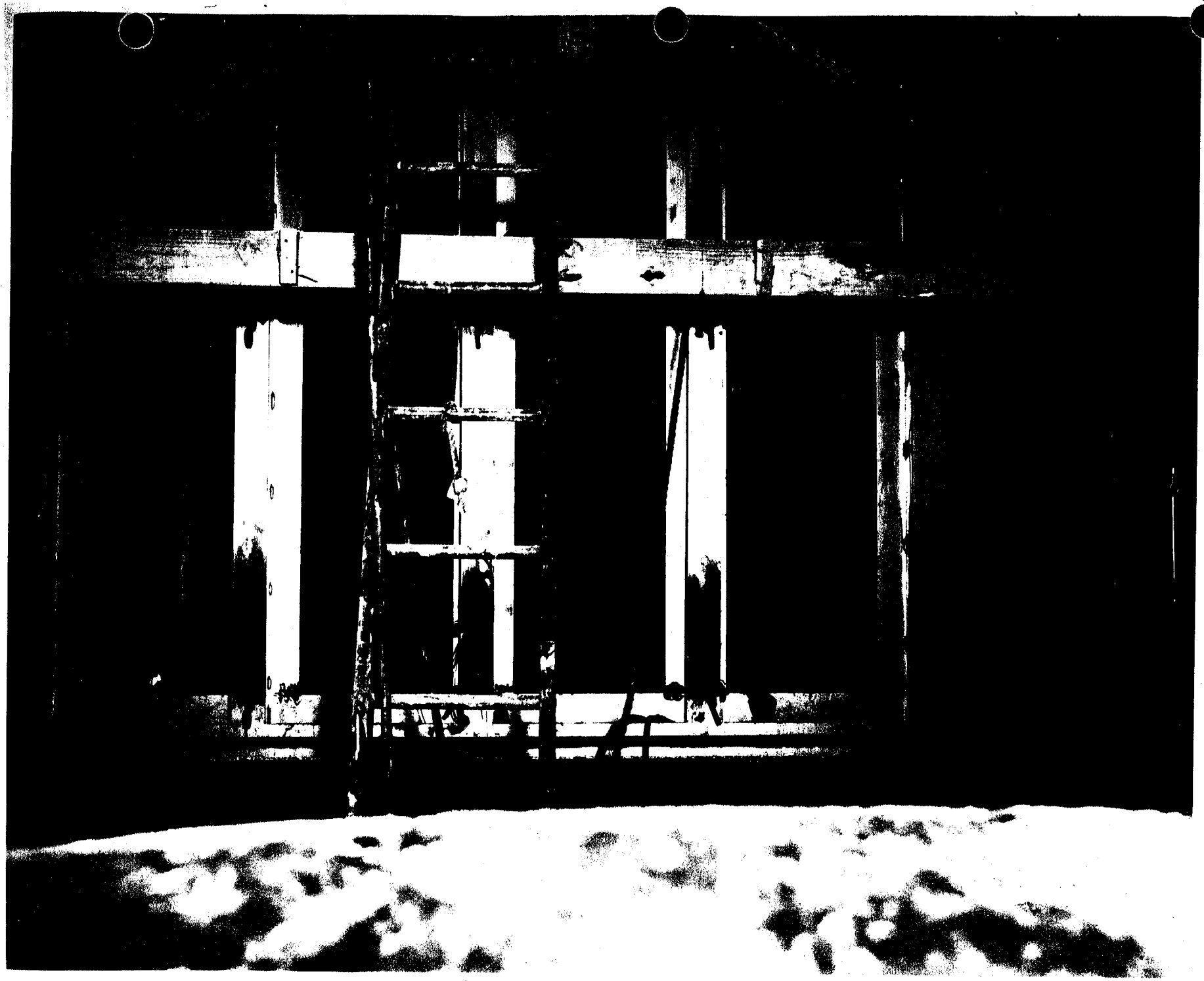
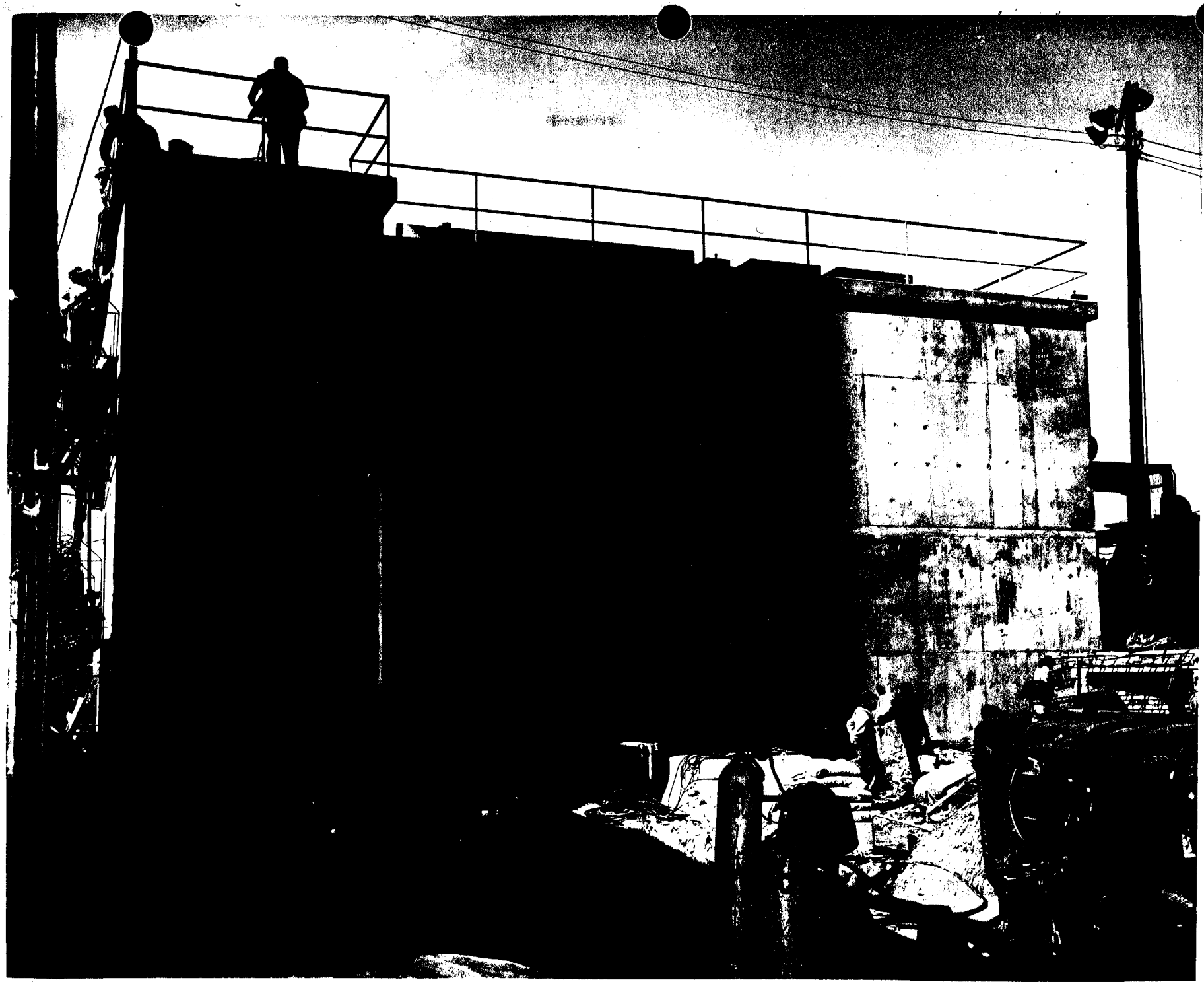
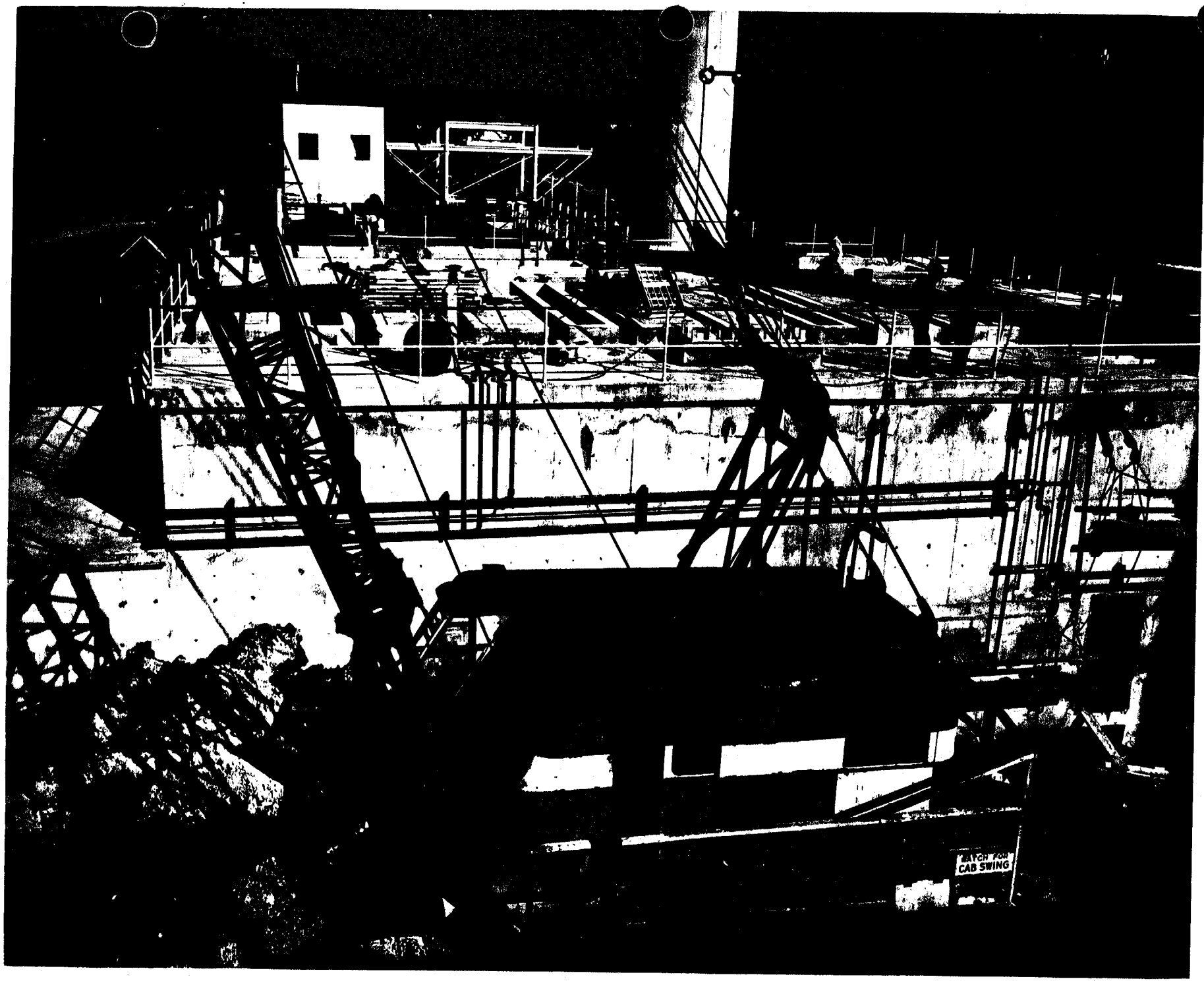
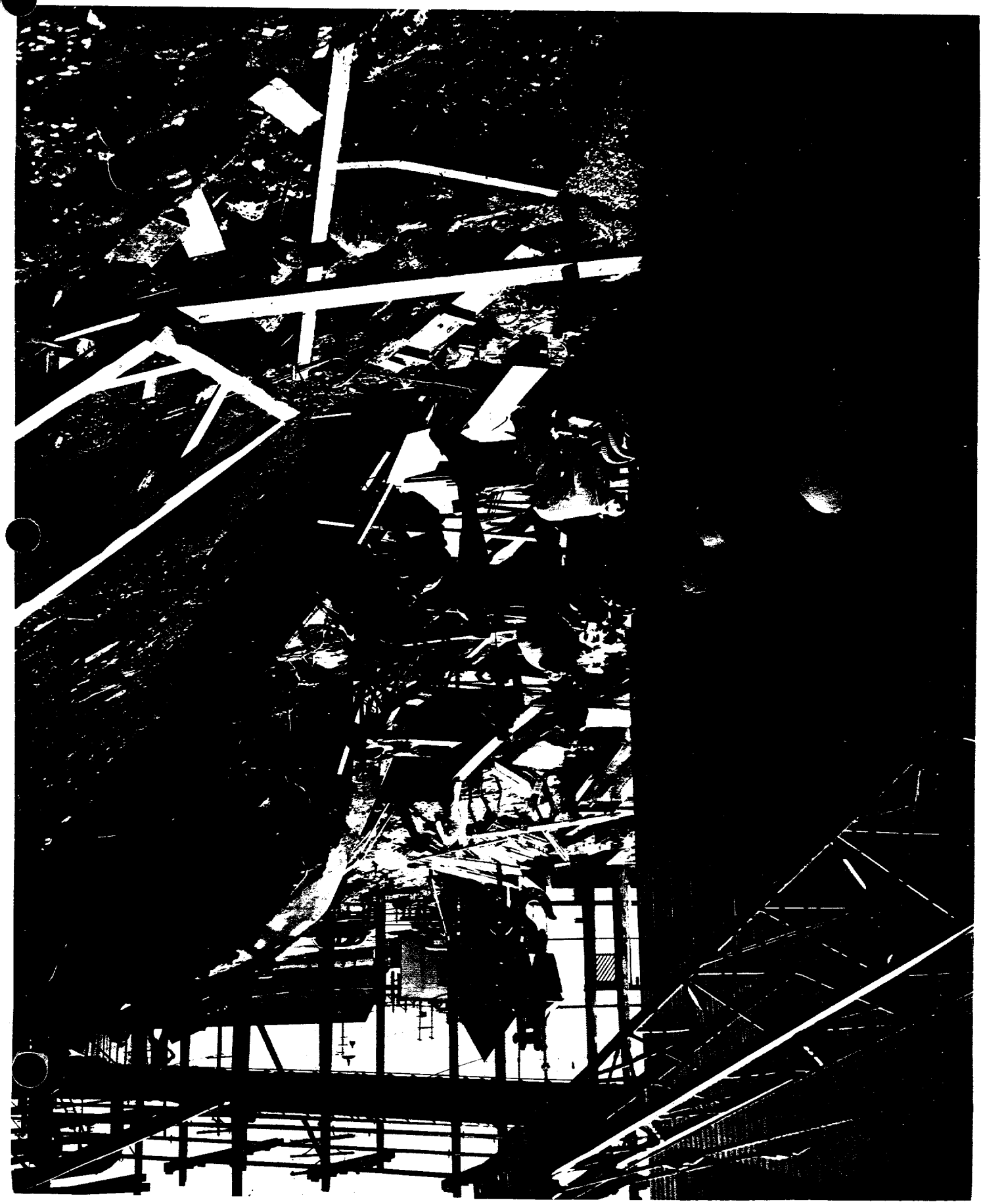
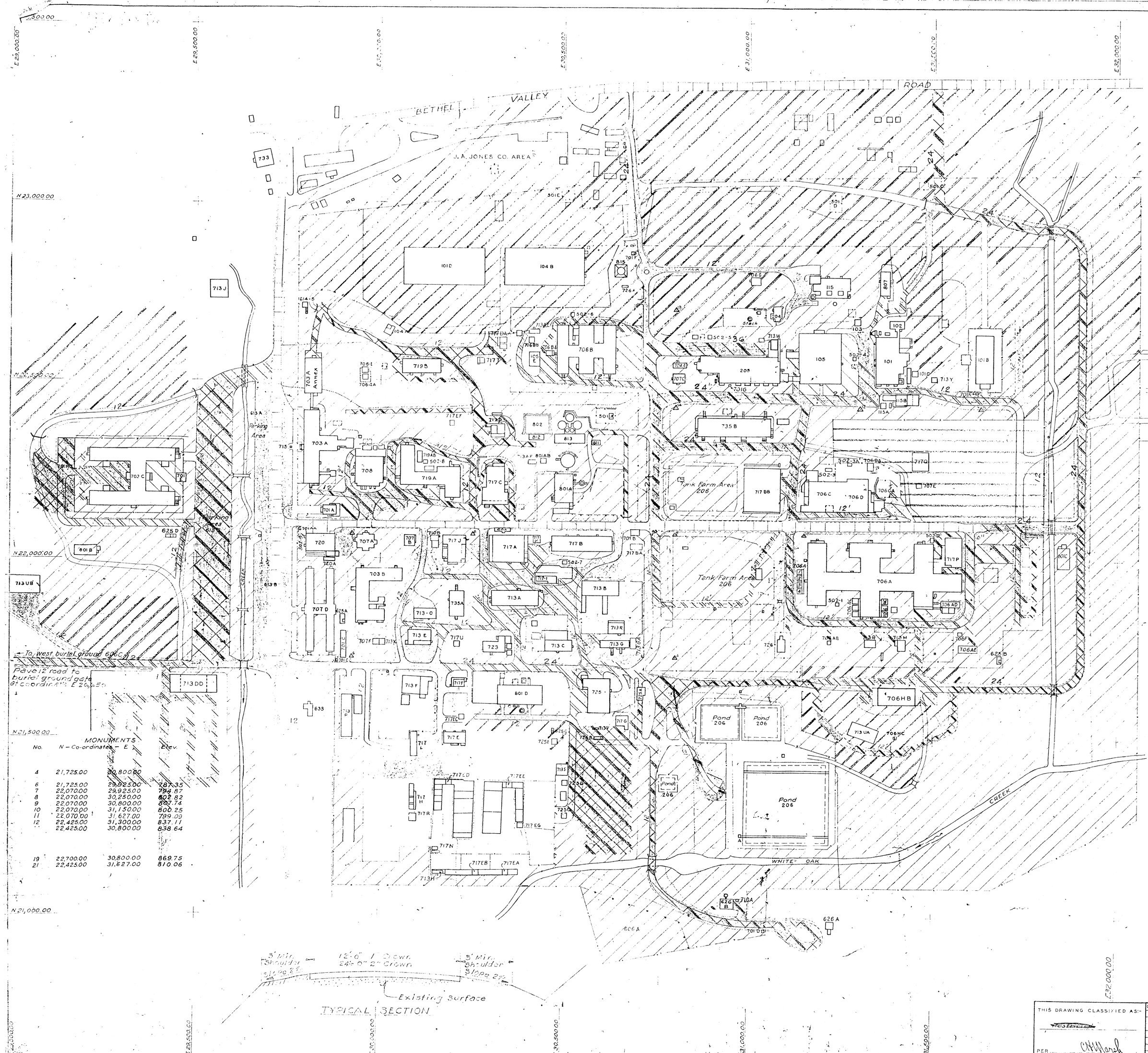





WATCH FOR
CAB SWING





THIS DRAWING CLASSIFIED AS: UNCLASSIFIED
PER C.H. Marsh

REV NO.	REVISIONS	APPROVED BY DATE
0	Revised to July 1 1948	

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PREV NO. SCALE 1" = 200' DATE
DRAWN BY R.F.T. 9-1-48
CHECKED BY 10-1-48
APPROVED BY 10-5-48
APPROVED BY 10-5-48
APPROVED BY 10-5-48
DWG NO. E-542 REV A8

DUST 603 CONTROL
BUILDINGS & ROADS
JULY 1, 1948

MONSANTO CHEMICAL COMPANY
CLINTON LABORATORIES
KNOXVILLE TENNESSEE

#1324

[redacted]

OAK RIDGE NATIONAL LABORATORY
CENTRAL FILES NUMBER
48-11-244

File Radiation Hazards Waste Disposal

Those Eligible to Read the Attached

Copy # 28

Date: November 22, 1948

Subject: Ninth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

To: C. N. Rucker

From: Stuart McLain

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[redacted]

TRANSMITTAL DATED 11-29-48

11-35

This document consists of 7 pages. No. 28 of 32 copies. Series A.

To: C. N. Rucker

From: Stuart McLain

Subject: Ninth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

This memorandum summarizes the work accomplished during the past week on the waste disposal work of the Laboratory. The eighth report was dated November 15, 1948, Central Files Number 48-11-163.

1. Pile Cooling Air

The filter building was essentially completed and pile cooling air was started through the building at 2 AM, November 15th. The pressure drop is 3.3" of water overall, with a 1.1" drop across the two thicknesses of American Air Filter FG50 and a 1" drop across the CWS #6 paper. This has reduced the pile power by 5% and increased the fan load by 12%. During the first week the pressure drop across the filters did not measurably increase. The collected activity as measured by an ion chamber directly in front of the FG50 filter is 85 mr 1 hour and in front of the CWS filters is 15 mr 1 hour. It is generally assumed that the activity of the 110 minute argon would cause a background of 15 mr/hr.

The accelerated plugging rate experiment has completed three weeks of operation. The single layer of FG50 pressure drop has risen from 0.60" to 0.80" at twice the normal rate and the CWS #6 paper has increased from 4.10" to 4.25" of water at four times the normal rate.

2. RaLa Operations

A RaLa run was started November 17th with the actual dissolving starting at 6 AM, November 18th. Filters were installed and operated without difficulty on the dissolver and vessel vent lines. For some yet undetermined reason the yield on this run was 1400 curies instead of the expected figure of 2'00 to 3000 curies. An investigation in conjunction with Hanford to determine the cause is underway.

Quantitative results are not available from the 706-D building sampling tests. However, these samples have become so radioactive as to make handling impossible, so it may be a week or more before the activity can be accurately determined. In the meantime, their decay is being carefully measured.

The newly installed filters on the vessel vent and dissolver lines became quite active, proving that they collected significant quantities of activity. The samples after the filters were also active, however, indicating that the new filters did not collect all the activity. A preliminary survey of the data indicates that the important activity discharge is via the cell ventilating air into the short stack at the 706-D building. The experiment using 2000 CFM of cell ventilation air instead of 15,000 was not completely successful, in that at least one time during the run the cell filled with steam and the air count within the building greatly increased. The dampers were opened for a period of several hours to lower the building air count.

Shortly after or during the transfer of solution from the dissolver by means of a steam jet to a vessel connected to the vessel vent line, the activity in the vessel vent line rose rapidly to a high level, indicating that a jetting operation as such may give rise to air borne activity.

The data collected will be available in considerably greater detail for the next report.

3. Redox Operations

At present Redox is being tested in the Pilot Plant Building. The dissolver off-gas line, the vessel vent air line, and the cell ventilation air mixed with several other streams are being tested for activity by cyclones and CWS #6 filters. The cyclones remove all particles greater than ten microns diameter and a part of the particles between one and ten microns diameter. The results obtained by sampling the various lines are presented below:

A. Dissolver Off-gas Line

The activity has been measured for four consecutive days. The first two days show negligible gamma activity and about six microcuries of beta activity. The activity during the second two days measured 40 microcuries of gamma and 22 microcuries of beta activity. Nearly all of this was found in the second test jar.

B. Vessel Vent Line

The average daily rate of flow of particles into the stack for 14 consecutive days was about 0.5 milli-curie of gamma and about three milli-curies of beta gamma. The average daily rate varied from one tenth to three times the average. About one half the activity was found in the cyclone and one half on the CWS paper. The average half-life of the activity collected was over one month.

C. Cell Ventilation

The cell ventilating air along with air from several isotope manufacturing operations, several hot hoods in an analytical laboratory, iodine operations in 706-C, and the vessel vent line from the Rale operations were collected together and sampled. Since Rale was not in operation, little if any activity was caused by this source. The cyclone caught very little activity. The filter paper caught from zero to 750 microcuries of gamma and two to 3750 microcuries of beta activity per day. A large part of this activity occurred during a non-routine operation in the pilot plant. It is indicated that the normal activity in the hot pilot plant cell is relatively low.

D. 706-C Bldg. Slug Dissolver Line

Three days of sampling this off-gas gas yielded an average of one millicurie of gamma and four millicuries of beta activity per day. When multiplied by three these results will represent the contribution of one slug dissolving in C Building. It should be pointed out that this operation is not continuous, but occurs whenever the demand for radioiodine require operation of this facility.

5. Area Decontamination

The area grassing and seeding program is 80 to 85% complete. The paving program is 60% complete. The map attached indicates the areas already paved.

6. Slug Rupture Experiments

The synthetic slug rupture experiment has operated for another week. Three slugs, after swelling to about 1.5" in diameter, show evidences of splitting open. Heating will be continued until complete destruction occurs.

7. Microscopic Examination of Filter Media

Electron micrographs of American Air Filter FG50 media (Brown), CWS#6 filter paper, and Owens-Corning Fiberglass Experimental Glass Wool Filter (White) are shown in the attached Figures. From these figures one may expect that the CWS paper will be the most efficient particle collector. For absorption of particles less than one micron in diameter it is necessary

for the particles to come into contact with the surface of one of the fibers of the filter media or in contact with the surface of one particle already attached to the filter media by absorption, adsorption, or mechanical entrainment. This statement is based on Langmuir's theory on the mechanical filtration of aerosols and has been confirmed by experiment. Since, for particles only a few hundredths of a micron in diameter, Brownian movement is of importance, a filter media having a very large surface area and very small fiber diameters such as possessed by CWS #6 becomes very efficient as the particles have a very high probability of coming into contact with the filter media due to their movement within the air stream. Thus, we expect that the filters on the pile exit air remove almost all particles above one micron in diameter and almost all of the very small particles of a diameter up to .2 micron diameter. In the intermediate range of about .3 to .4 micron diameters some of the particles probably pass through the filter media.

The effect of the increased ionisation due to the radioactivity present is entirely unknown. It may be that it is this particle size range of about .4 micron that is most hazardous from a health viewpoint. Dr. T.F. Hatch of the Industrial Hygiene Foundation of Pittsburgh, stated verbally in a conference on this problem that he believed this size range is the most likely to be hazardous.

Since so little is known at present concerning these problems, the installation of the electrostatic precipitators is being delayed until more research results are obtained. Meanwhile, measurements of the particles passed through the CWS #6 paper will be made to determine the efficiency of the filters in this size range. A comparision will be made between the filters and the impact tester.

Some references dealing with this subject are:

1. NDRC, Div. B, OSRD No. 865, Subject: Filtration of Aerosols and the Development of Filter Materials, W. H. Rodebush, I. Langmuir, & V. K. LaMer, dated 9-4-42.

2. NDRC, Div. 10, OSRD No. 3460, Subject: Smokes & Filters – Supplement to Sect. I, I. Langmuir & K. B. Blodgett, dated 4-12-44.

3. NRC (Canada), C.E. 42 (Edgewood Arsenal File No. ETF 550 Ca 661), Subject: Efficiency of Filters & Particle Size, E.F. Burton, et al, dated Nov., 1944.

4. EEICWST/NA-IR-6, Subject: German CW Preparations, Captain J. W. Gost, 7-12-44.

8. Liquid Waste Pilot Evaporator

A pilot scale evaporator for chemical wastes has been installed and as soon as some vacuum leaks are found and corrected, pilot scale experiments will start on cold solutions. By December 1, runs on actual wastes should be underway.

Stuart McLain

Stuart McLain

SMcL:eg

EM Plate No. 351
Experimental Glass Wool
Filter (Brown)
3000X

EM Plate No. 350
Experimental Glass Wool
Filter (White)
3000X

EM Plate No. 352
Filter Paper
3000X

Waste Disposal

NOV 26 1948

OAK RIDGE NATIONAL LABORATORY
CENTRAL FILES NUMBER
48-11-244

Date November 22, 1948

File

Subject: Ninth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

Those Eligible to Read the A Attached

To: C. N. Rucker

From: Stuart McLain

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TRANSMITTAL DATED 11-24-48

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This document consists of 7 pages. No. 19 of 32 copies. Series A.

To: C. N. Rucker

From: Stuart McLain

Subject: Ninth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

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[redacted]

S [redacted]

sampling of what?

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[redacted]

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Stuart McLain

SMcL:eg

ChemRisk Repository Number: 863 Document Number: ORNL/CF 48-11-293
Title: "Tenth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal (to C. N. Rucker)"
Authors: C. E. Winters
Abstract: Tests are planned to determine the efficiency of the filter building; results due by about December 24. Discusses experiment to lower 706-D (RaLa) cell ventilation air from 20,000 CFM to 2,000 CFM. Room filled with stream, so will try 3,000 CFM. Will add condensers or traps to alleviate the problem. In the meantime, FG50 and CWS#6 paper filters will be installed starting with January 3 run. Cell ventilation air release about 3.5 to 4.0 curies of gamma per run. Vessel vent line released about 3/4 Ci during the first 36 hours after dissolving; this flows into duct carrying Hot Pilot Plant cell ventilation air to the 205 stack. Also gives data for dissolver vent line. Discontinued sampling of Redox operations because of comparatively little particulate activity. First run on evaporator with active waste was 11/26/48. Lists progress reports 1-9 CF numbers.
Reviewer: T. E. Widner
Document Source or Location: X-10 Lab Records
Date Document Issued: 11/29/48
Classification Category: unc
Site Document Addresses: X
Primary Document Category: hw
Secondary Document Category: sa
Date Entered: 02/10/93
Entered By: cmv
Keywords: Pile, Graphite reactor, Particles, Filters, Slug ruptures, RaLa, Hot pilot plant, Redox
yes, we have a copy.

97

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OAK RIDGE NATIONAL LABORATORY
CENTRAL FILES NUMBER
48-11-293

C.F.

Date November 29, 1948

File

Subject: Tenth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

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To: C. N. Rucker

From: C. E. Winters

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For: M. T. Bray, Supervisor
Laboratory Records Dept.

TRANSMITTAL DATED 1-24-49

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This document consists of 6 pages. No. 28 of 30 copies. Series A.

To: C. N. Rucker

From: C. E. Winters

Subject: Tenth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

This memorandum summarizes the work accomplished during the past week on the waste disposal work of the Laboratory. The Ninth report was dated November 22, 1948, Central Files No. 48-11-244.

1. Pile Cooling Air

The filter building operated the past week without serious incident. The pressure drop did not significantly increase. Tests are planned to determine the efficiency of the Filter building. Results should be available by about December 24.

No ruptured or swollen slugs have been detected since September 25, 1948.

2. 706-D Building Operations (RaLa manufacture)

RaLa run #28 was shipped on November 22, 1948. Approximately 1400 curies were shipped. The dissolver solution analyzed only 2700 curies against a calculated value of 6500 curies. Efforts are being made to determine the cause of this discrepancy.

Only part of the results of the test on the RaLa run which started November 17 are now available. These are summarized below:

a. Cell Ventilation Air

The experiment to lower the cell ventilating air from 20,000 cfm. to 2000 cfm. was successful except that near the end of the run the cell filled with steam and visual observation of operations was impossible. The fan dampers were opened for about two hours to clean out the cells. The next time the cells are decontaminated, condensers or traps will be installed to alleviate the problem. In the meantime American Air Filter FG-50 and CWS #6 paper filters with a design capacity of 3000 cfm will be installed before the next run, which is scheduled to start the week of January 3. If the cells steam up with 3000 cfm, operations will be carried out without visual aid.

[redacted]

The cell ventilating air was sampled and the particles collected in a cyclone followed by a piece of CWS #6 paper. The activity found in the cyclone jar was small, however, preliminary results on the paper indicate that air from activity from this source (as measured 2 days after the run was complete) was of the order of 3.5 to 4.0 curies of gamma per run. Data on the halflife and beta activity are not yet available.

It is planned to sample this air steam during the next run, before and after the new filters, in considerably greater detail.

b. Vessel Vent Line

This line was sampled before the new filter, and at the base of the 205 stack after it was mixed with other studied sources of activity. The data are very incomplete but the indication is that over 3/4 curie passed into the new filter during the first 36 hours after the dissolving. Unfortunately mechanical difficulties occurred and the latter part of the run was not sampled at this point.

No quantitative data are available as yet from the sampler at the base of the 205 stack. In this case very little activity was caught by the cyclone indicating that larger particles are very infrequent in this line. Activity was found on the paper and data will be available for the next report.

For the next RaLa run, a sampler will be installed in the line, after the filters, and before it enters the duct carrying the Hot Pilot Plant cell ventilation air. This will allow considerably more accurate analysis of the problem.

c. Dissolver Vent Line

Samplers were installed before and after the new filter in this line. Complete data are not available, however, the gamma activity (as measured 5 days after dissolver ceased) of the CWS #6 filter indicated 57 millicuries in the line before the filter and 16 millicuries after the filter. The cyclone jar before the filter was quite active, whereas the cyclone jar after the filter was only slightly active, indicating the major portion of the larger particles and the mist is lost between the two samples.

It is planned to sample this line during the next RaLa run after the filter, in considerably greater detail.

3. Redox Operations

In view of the comparatively small amounts of particule activity found in these lines, sampling activity has been discontinued, in order to concentrate on obtaining data on the larger contributors.

4. Area Decontamination

The area grassing and seeding program is about 92% complete. The paving program is 70% complete. The attached map indicates the status of these programs.

5. Liquid Waste Pilot Evaporation

The installation of this evaporator has been completed. The first run on active waste was made Friday, November 26. No data are available.

6. Detection of Slug Ruptures

After 35.5 days of continuous operation at 250°C, and 91 shutdowns, one slug (No. 1) in the 16 slug mock pile channel has ruptured. Figure 1 shows photographs of this slug and two others (Nos. 7 & 8) which are beginning to burst.

Slug No. 1 with a hole in the end weld had swollen from 1.17 in. diameter to 1.55 in. dia. before splitting its jacket. The two splits visible in the photographs are very similar and almost 180° apart. These splits appeared at the same time and spread rapidly to about one-half inch in length. At this time the air flow rate through the channel was 64 ft/sec. an easily detectable decrease of 8 ft/sec. from the flow at the start of the test.

After slug #1 split, all slugs were removed for photographs and measurements. The glass wool of the filter was removed and the uranium oxide leached out with nitric acid but results are not yet available on the amount of oxide caught.

The test has been resumed and will be continued to observe the progress of the ruptured slug.

7. Pile Stringers

It has been found that a number of particles escape from the pile into the pile building whenever one of the isotope stringers are moved. A collector is being designed and installed.

C. E. Winters

C. E. Winters

CEWteg

APPENDIX

The reports to date on this subject are as follows:

1. First Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal, September 27, 1948, Central File No. 48-9-254.

2. Second Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal, October 4, 1948, Central File No. 48-10-49.

3. Third Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal, October 11, 1948, Central File No. 48-10-132.

4. Fourth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal, October 18, 1948, Central File No. 48-10-236.

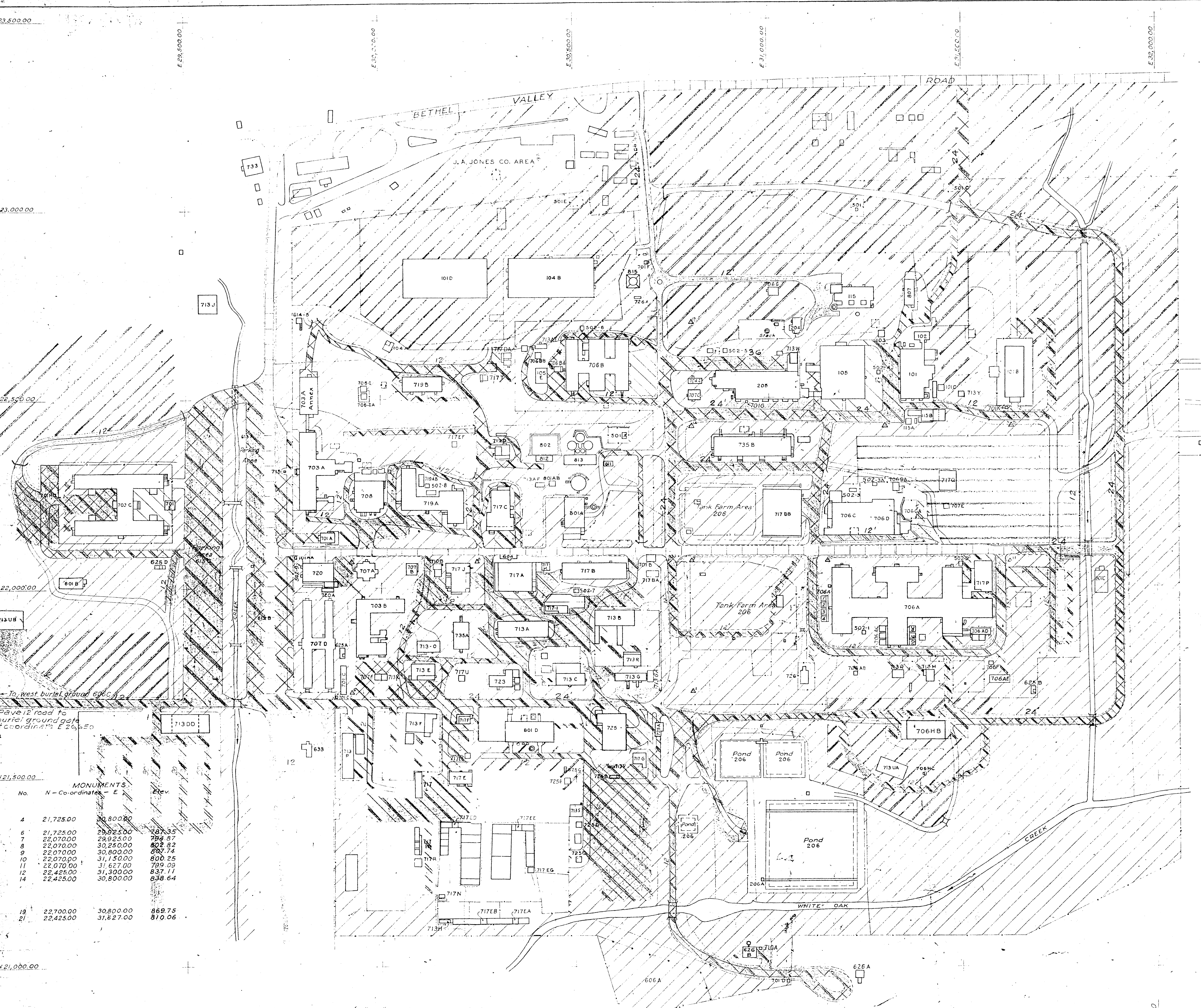
5. Fifth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal, October 25, 1948, Central File No. 48-10-320.

6. Sixth Weekly Progress Report On Oak Ridge National Laboratory Waste Disposal, November 1, 1948, Central File No. 48-11-17.

7. Seventh Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal, November 8, 1948, Central File No. 48-11-108.

8. Eighth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal, November 15, 1948, Central File No. 48-11-163.

9. Ninth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal, November 22, 1948, Central File No. 48-11-24[illegible].



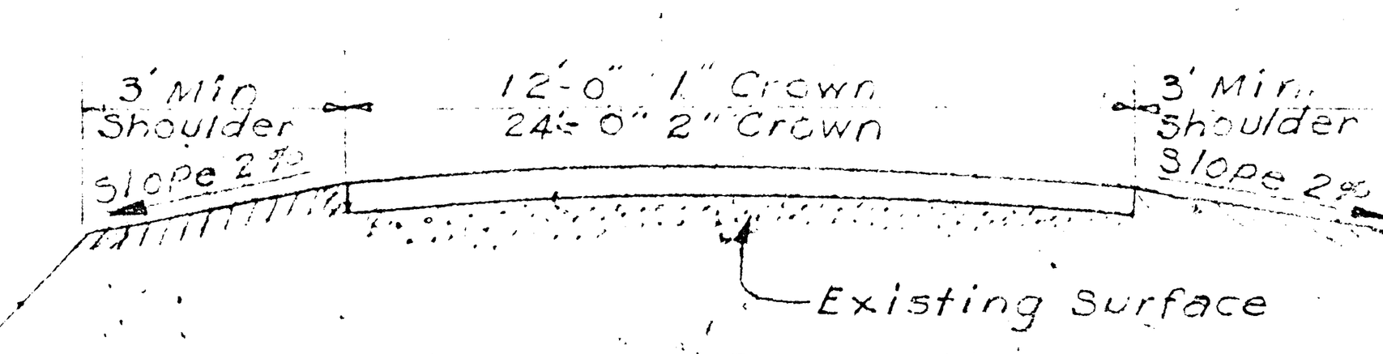
NOTE
Roads and areas shaded shall have 1½" plant mixed asphalt surface after scarifying and resurfacing.

LEGEND

- Building, steps & building number.
- Monument.
- Emergency generator & number.
- Fence & gates. Post & cable fence.
- Road.
- Concrete or cinder block retaining wall. Timber retaining wall.
- Sign.
- Existing grass
- Radio isotope area
- Landscaping under contract
- Proposed grassing
- Road shoulder
- Ditch
- Existing bituminous surface.
- Barricade
- Completed Scarifying Only
- Completed One Surface Treatment Only
- Completed Surface Treatment

MONUMENTS

No.	N – Co-ordinates	– E	Elev.
4	21,725.00	30,800.00	
6	21,725.00	29,925.00	787.35
7	22,070.00	29,925.00	794.87
8	22,070.00	30,250.00	802.82
9	22,070.00	30,800.00	807.74
10	22,070.00	31,150.00	800.25
11	22,070.00	31,627.00	789.09
12	22,425.00	31,300.00	837.11
14	22,425.00	30,800.00	838.64
19	22,700.00	30,800.00	869.75
21	22,425.00	31,627.00	810.06



TYPICAL SECTION

DUST 603 CONTROL
BUILDINGS & ROADS
JULY 1, 1948

MONSANTO CHEMICAL COMPANY
CLINTON LABORATORIES
KNOXVILLE TENNESSEE.

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PER CHMarsh

REV. NO.	REVISIONS	APPROVED BY DATE
9	Revised to July 1, 1948	

REFERENCE DRAWINGS

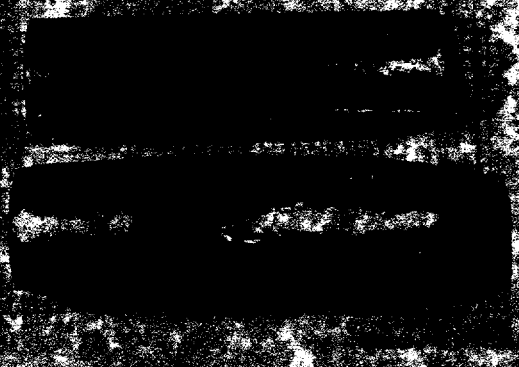
PROJ. NO. SCALE 1"=100'
DRAWN BY RBT.-JHG.-EGT. 9-1-45
CHECKED BY JHG.-EGT. 10-1-45
APPROVED BY [signature] 10-5-45
APPROVED BY
APPROVED BY [signature] PROJ. ENGR. 10-5-45

DWG. NO. E-542A REV. 9

#1324

Plate I
Slug #1 -Showing 2 splits in jacket after 35.5 days at 250° C. Max. dia. = 1.55 in.

Plate 2
Slug #7 - After 35.5 days at 250° C Max. dia. = 1.34 in.



Slug #[illegible] After 35.5 days at 250° C Max. dia. = 1.32 in.

95

[redacted]

OAK RIDGE NATIONAL LABORATORY
CENTRAL FILES NUMBER
48-12-29

Date December 6, 1948

File

Subject: Eleventh Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

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From: C. E. Winters

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Lid-1116
Dorie Patterson
For: M. T. Bray, Supervisor
Laboratory Records Department

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4-15-59

TRANSMITTAL DATE 12-7-48

This document consists of 5 pages. No. 16 of 29 copies. Series A.

To: C. N. Rucker

From: C. E. Winters

Subject: Eleventh Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

Effective with this issue this memorandum will be issued bi-weekly instead of weekly; accordingly, the next report will be dated December 20, 1948. This change is believed desirable because the information to be presented in the future will be the results of more detailed testing, which data inherently become available at less frequent intervals.

This memorandum summarizes the work accomplished during the past week on the waste disposal work of the Laboratory. The Tenth report was dated November 29, 1948, Central Files No. 48-11-293.

1. Pile Cooling Air

The pressure drop across the filter building has increased from 3.30 inches of water to 3.95 inches of water. Most of this increase has occurred across the first filter. As yet it has not been necessary to decrease the pile power on account of decreased air flow.

2. 706-D Building Operations

The drawings for a filter house to filter 706-D cell ventilating air were completed this week. It is planned that the installation will be complete before the next RaLa run scheduled for January 3rd.

Considerable more data are available on the run completed November 22, 1948. These will be reported below.

a. Cell Ventilating Air

These data are reported as being the values as counted approximately 4 days after completion of the run. The apparent half life at that time was about 6 to 8 days.

2. (Con't.)

a. Cell Ventilating Air (Con't.)

Total activity in line as measured by:

	Gamma	Beta
Cyclone sampler	133 MC	169 MC
CWS #6 paper sampler	15,000 MC	(not determined)

These data indicate that the cell ventilating air is by several orders of magnitude the greatest contributor to area contamination yet detected. These data also indicate that most of the activity is in the finer particles, that is, smaller than 1 to 10 microns in diameter.

b. Vessel Vent Line

The data available for this line are less accurate than other sources for several reasons. First, the pump drawing the samples thru the filter seized when the run was approximately half over. The data presented give the results for this portion of the run only. It is the general feeling that the activity discharged during the period not sampled was much larger than during the sampling period. Secondly, the sampler after the new filter operated on the line after 20,000 CFM of Hot Pilot Plant cell ventilating air had been intermixed. The data therefore represent the total of all sources of activity discharging through this line rather than the contribution of 706-D building only. Up until this time, these other sources have fortunately been small.

Before F6-50 Filter (Data cover only first 60% of the run) As measured 6 days after pump stopped. Apparent half life 6-8 days.

	Gamma	Beta
Cyclone activity	176 MC	90
Paper activity	1170 MC	not determined

[redacted]

This document contains [redacted] within the [redacted] Energy Act of 1946 and/or information [redacted] within the meaning [redacted] Espionage Act, [redacted] its transmission [redacted] revelation of its [redacted] in any manner to [redacted] unauthorized person is [redacted] and may result in [redacted] criminal [redacted]

[redacted]

2. (Con't.)

b. Vessel Vent Line (Con't.)

After FG-50 filters (plus other contributions) as measured 1 day after run.

	Gamma	Beta
Cyclone activity	0.05 MC	not detected
Paper activity	465 MC	not determined

The above data are useful to indicate that considerable activity is discharged through this line eventhough a filter has been installed. During the next run, samples will be taken at a point after the filters but before it is diluted with other of activity.

c. Dissolver Vent Line

The data given in the previous memorandum have been recalculated and additional data are now available. Figures given are the millicuries of gamma activity as measured 5 days after completion of the run. The apparent half life of the materials have been found to be approximately 6 to 8 days.

Before FG-50 filters

Cyclone activity	220 MC.	(The most active of the 3 jars collected was lost. The activity report is that of the 2 remaining jars)
CWS #6 paper	139 MC	
Total	359 MC	

After FG-50 filters before discharge into 205 stack

Cyclone activity	3.7 MC
CWS #6 paper activity	32.2 MC
Total	35.9 MC

[redacted] Apparently the filters, together with the connection in the line have retained [redacted] 60 seconds that elapse between filtration by the FG-50 filter and the sampler are unimportant. The apparent filter efficiency is 75 to 80% for the fine particles and quite high for the courser material.

[redacted]

2. (Con't.)

c. Dissolver Vent Line (Con't.)

One discrepancy that is as yet unexplained is the fact that electroscope readings on these samples do not check the values as actually counted by quite a large factor. Before one may have confidence that samples have been counted correctly, samples have not been mixed, or errors made in calculations, this discrepancy will need to be explained.

3. Area Decontamination

The area grassing and seeding is about 92% complete. Heavy rains during the past week have temporarily stopped progress. The paving program is now 85% complete.

4. Liquid Pilot Plant Evaporation

This evaporator has operated one week. Several important factors have been observed.

a. No appreciable scaling has been detected to date.

b. The decontamination factor will be in the range of 10^3 to 10^4. As experience is gained, operation should be possible at 10^4 or better.

c. The decontamination factor of the condensate as compared to the still bottoms appears to be constant as the solution remaining in the still pot becomes more concentrated.

d. The supernate from W-5 carries only 5 to 10 percent as much activity as that of a more representative sample containing both liquid and sludge. The order of magnitude of the activity of the supernate is about 2×10^5 beta disintegrations per minute per milliliter and 2×10^3 gamma disintegrations per minute per milliliter.

e. The overall heat transfer coefficient at a reasonable evaporation rate is about 150 Btu/hr/ft^2/°F.

5. Synthetic Slug Rupture Experiment

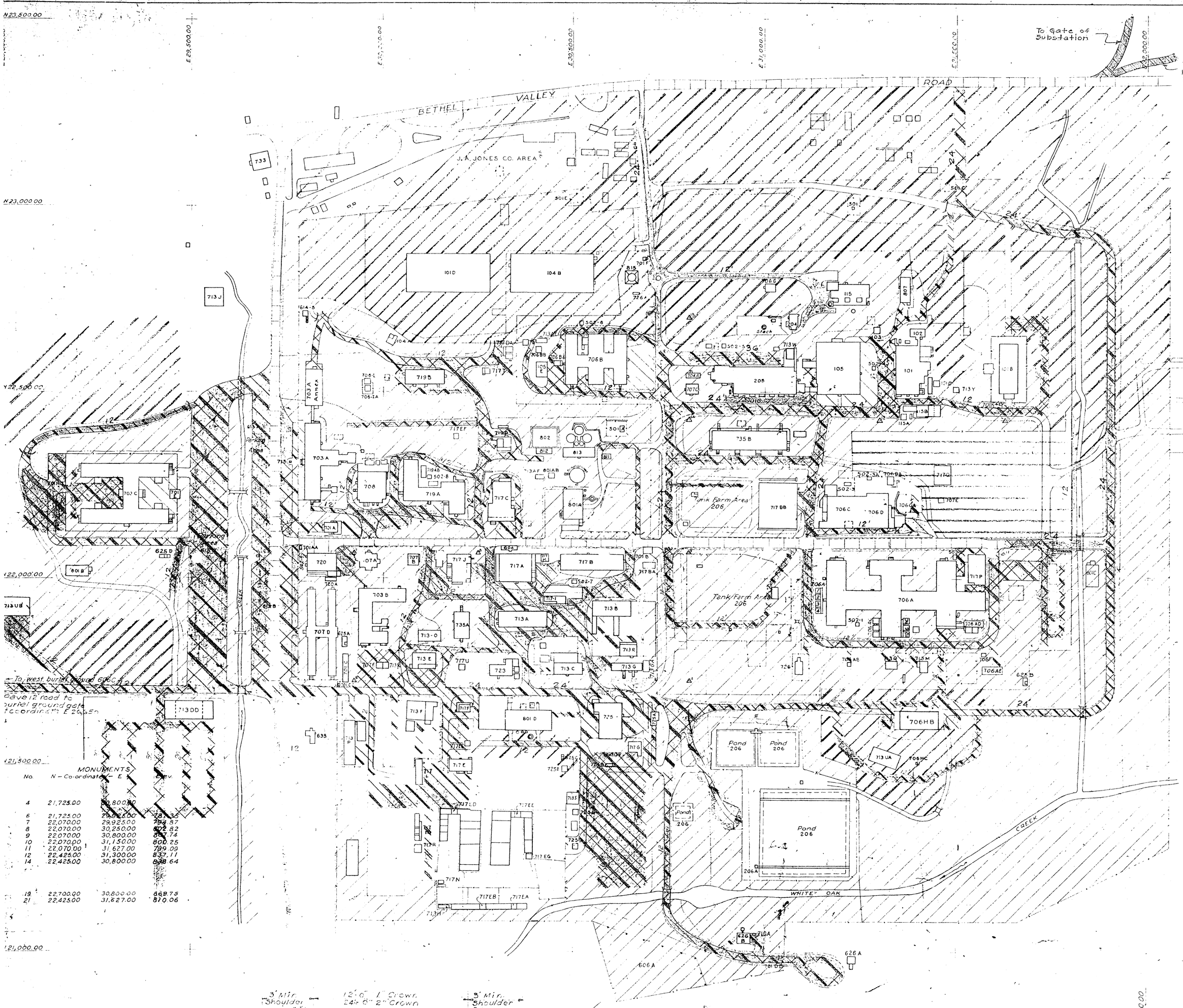
The slugs as illustrated in last week's report have continued to grow. The number one slug has now increased so that the split is about 1/8" wide. This test will continue until either the uranium disappears from inside the slug or the swelling progresses to the point where the mock channel may be completely blocked. At the present rate this may take another month or more.

C E Winters

C. E. Winters

CEW:tks

[redacted]



MONUMENTS

No.	N – Co-ordinate	E	Elev.
4	21,725.00	29,800.00	
6	21,725.00	29,962.50	781.35
7	22,070.00	29,925.00	784.87
8	22,070.00	30,250.00	822.82
9	22,070.00	30,800.00	867.74
10	22,070.00	31,150.00	800.25
11	22,070.00	31,627.00	799.09
12	22,425.00	31,300.00	837.11
14	22,425.00	30,800.00	838.64
19	22,700.00	30,800.00	869.73
21	22,425.00	31,627.00	810.06

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PER C.H. Ward

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PROJ. ENGR.

DUST 603 CONTROL
BUILDINGS & ROADS
JULY 1, 1948

MONSANTO CHEMICAL COMPANY
CLINTON LABORATORIES
KNOXVILLE TENNESSEE.

DWG. NO. E-542A REV.

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1324

OAK RIDGE NATIONAL LABORATORY
CENTRAL FILES NUMBER
48-12-203

[redacted]

S.7.

Date December 21, 1948

File

Subject: Twelfth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

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Copy # 29

To: C. N. Rucker

From: C. E. Winters

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P.A. Bonnay 5-20-58

For: N. T. Gray, Supervisor
Laboratory Records Dept.
ORNL

[redacted]

This document has been approved for release to the public by:

David R. Hamm 6/19/95

Technical Information Officer ORNL Site — Date

This document consists of 4 pages, No. 29 of 29 copies. Series A.

To: C. N. Rucker

From: C. E. Winters

Subject: Twelfth Weekly Progress Report on Oak Ridge National Laboratory Waste Disposal

This memorandum summarizes the work accomplished during the past two weeks on the waste disposal work of the Laboratory. The Eleventh report was dated December 6, 1948, Central Files No. 48-12-79.

1. Pile Cooling Air

a. Pressure Drop

The pressure drop across the filter house has increased 0.8 in. during the past two weeks to a total of 4.75 inches of water from the original 3.30 inches of water. As before, nearly all the increase has occurred across the FG-50 layers rather than the CWS #6 paper layer. One may estimate that a filter change may be necessary during January, 1949.

b. Filter Activity

The gross activity as indicated by ion chambers located approximately 18 in. in front of the filter media indicate 90 to 100 mr/hr in front of the FG-50 and 25 mr/hr in front of the CWS #6 paper. These represent only slight increases over those readings obtained at the startup of the operations, and are probably largely due to radiation from the 110 minute argon activity of the cooling air.

c. Slug Ruptures

There has been no evidence of ruptured or swollen slugs since September 25, 1948.

d. Filter House Efficiency Experiments

The first attempt to measure the filter house efficiency using barrier type materials as the collector met with limited success due to the low level of activity found. Three sampling

1. Pile Cooling Air (Con't.)

d. Filter House Efficiency Experiments (Con't.)

locations were established, the first in the riser carrying the pile cooling air to the first filter, the second, drawing a sample after leaving the FG-50 layers and just before being filtered by the CWS #6 paper, and the third, after the CWS #6 paper filter but before the fans. The samplers were operated to cover 10 days of actual pile operation. The results follow as calculated in terms of millicuries of activity per day for the whole cooling air stream.

Location	Gamma	Beta	Alpha
Before the FG-50	2	6	0.002
After FG-50 but before CWS	1	5	0.003
After CWS #6 paper	1	6	Background

The gamma figures reported are those as obtained on an acid solution of the barrier. The beta and alpha were reported as the average of three, one square inch portions of barrier counted directly. Corrections have been made for geometry and counter efficiencies.

Before drawing any conclusions from these data one should consider two complicating factors.

(1) The total activity collected for counting was small, in several cases the observed counting rate was not over 130% of the counter background, accordingly, serious consideration of such results may lead to gross error in the conclusions.

(2) The readings obtained may be due to absorbed radioactive gas, or to the collection of activity from the decay of gaseous fission products..

To observe these phenomena and improve the reliability of the data, the next series of collectors will operate for at least 30 days, and an experiment will be performed in which the pile cooling air will be drawn through two pieces of barrier in series in order to observe the activity accumulating on the second layer. This experiment will likewise operate for

[redacted]

1. Pile Cooling Air (Con't.)

d. Filter House Efficiency Experiments (Con't.)

at least 30 days to accumulate sufficient material for more accurate counting.

The important conclusion to be drawn from the above data is that during the period measured very little particulate activity was in the pile cooling air stream. This is qualitatively borne out by the lack of increase of filter house media activity.

2. 706-D Building Operations

The next RaLa run is scheduled to start January 10, 1949. J. A. Jones Company started excavations for the foundation pad December 16, 1948, for the cell ventilating air filter. Completion is scheduled for December 31, 1948. This filter will be similar to that for the pile cooling air except that it will be on a far smaller scale.

It is planned to sample the run scheduled for January 10th in far greater detail than that accomplished during the last run. These data should indicate the magnitude of the problem to be experienced in a clean-up of the residual atmospheric pollution problem.

3. Area Decontamination

The grassing, seeding and paving programs are over 99% complete.

4. Liquid Pilot Plant Evaporator

Additional operation time of the pilot scale evaporator has disclosed no changes in the data of the last report. The pilot scale evaporator is to be dismanteled to make way for receiving facilities for tank trucks of waste from other sites.

The conclusion reached from this work is that the original proposal for a larger scale evaporator is adequate for this type of waste.

C. E. Winters

C. E. Winters

CEW:tks

49-1-130

This document consists of 9 pages. No. 21 of 30 copies. Series A.

To: C. N. Rucker

From: C. E. Winters

Subject: Thirteenth Progress Report on Oak Ridge National Laboratory Waste Disposal

This memorandum summarizes the work accomplished during the past two weeks on the waste disposal work of the Laboratory. The Twelfth report was dated December 21, 1948, Central Files No. 48-12-79.

← 11th? TEW

1. Pile Cooling Air Pressure Drop

a. The pressure drop across the filter house has increased 1.1" w.g. in the last two weeks. This can be compared to the increase of .8" w.g. in the previous two-week period. The following table gives detailed information on the pressure drop data:

F.G. #50 Filters	12/16/48	1/2/49	Increase
#1 Cell	2.6" w.g.	3.7" w.g.	1.1" w.g.
#3 Cell	2.3" w.g.	3.1" w.g.	0.8" w.g.
C.W.S. #6			
#1 Cell	1.15" w.g.	1.3" w.g.	0.15" w.g.
#3 Cell	1.11" w.g.	1.25" w.g.	0.14" w.g.
House	4.75" w.g.	5.9" w.g.	1.15" w.g.

b. Filter Activity

One of the 600 filter pockets in the filter house containing 2 layers of FG-50 was removed December 28th, after about 45 days service. Upon removal the pocket measured about 25 mr/hr at a distance of several inches. A cross section showed that a dark colored dirt had penetrated about 80% of the way through the first layer, and that the remainder was the normal yellow color. Sections of the cross section sample showed that the activity followed the color as follows:

1. Pile Cooling Air Pressure Drop (Con't.)

b. Filter Activity (Con't.)

		c/min.
1st layer of FG-50	1st 25%	25,000
	2nd 25%	2,000
	3rd 25%	750
	4th 25%	500
2nd layer of FG-50	1st, 2nd, 3rd and 4th - 25% each	500

The pocket was then mechanically shaken to remove loose dirt, from which 8 grams were collected, which would be equivalent to 10 pounds for the whole filter house. If one estimates that 2/3 of the dirt were removed by the shaking, the total dust load of the filter house would be about 15 pounds.

A spectrographic analysis of the collected dirt indicated strong calcium and magnesium, moderate sodium and very weak silicon and aluminum. One would estimate from this, that the bulk of the solids in the filter house originated from the minerals in the water sprayed into the exit air for cooling and not from clay or cement type dusts. It has been estimated that as much of 80 pounds of minerals could have been sprayed into the cooling air stream before the change over to demineralized water was made. These observations are not completely consistent with the pressure rise data, in that the pressure drop continued to increase in a reasonably linear fashion at the previously established rate after the change over to demineralized water, unless the water solids are in such physical form that they do not significantly plug the filter, or that they act as a filter aid for other dirt.

Activity measurements on the dust one day after removal indicate 3.5×10^7 d/min per gram of beta activity and 1×10^7 d/min (gamma activity). This extrapolates to about 110 millicuries of beta and 30 millicuries of gamma activity in all of the FG-50 in the filter house.

On the basis of the above experience, together with data gathered on the filter house efficiency experiments, it has been decided to use FG-25 (a coarser and much cheaper material)

1. Pile Cooling Air Pressure Drop (Con't.)

b. Filter Activity (Con't.)

instead of FG-50 for the first layer for subsequent filter changes in the hope of decreasing replacement cost, increasing periods between replacements and not significantly decreasing filter house efficiency.

c. Slug Rupture

There have been no ruptured or swollen slugs since September 25, 1948. On December 27, a row of slugs was discharged in which one damaged slug was found after discharge. This slug has been saved and will be examined in more detail after a cooling-off period.

d. Filter House Efficiency Experiments

This test consisted of three barrier filters whose sample streams were drawn from immediately before the filter house, from the section intermediate between the FG-50 and the CWS paper filter pockets, and from immediately after the filter house.

The barrier filters were removed on December 15, 1948, after the pile air stream had been sampled for a total of 10 days test filter operating time.

Three one inch squares from each filter were submitted for counting dry as a quick check. The remainder of each tube (ca. 1.2 sq. ft.) was dissolved in a slightly greater than stoichiometric quantity of hot nitric acid and the solutions submitted for counting. It has developed that the method of solution results in considerable activity loss. Therefore the dry counts of the barrier squares (filter face) offer the only reliable activity information and that carries a wide uncertainty because of the meager sampling, i.e., 3 sq. inches.

Before Filter

Time after sampling days	dis/min/sq. in. β	γ	α
0	1.43×10^4	7×10^3	4
1	1.03×10^4	2×10^3	4
2	7.6×10^3	3×10^3	-
18	4.1×10^3	-------	-

1. Pile Cooling Air Pressure Drop (Con't.)

d. Filter House Efficiency Experiments (Con't.)

Assuming 80,000 SCF per minute filter house flow, these data indicate the delivered activity at this test point, (by activity caught and still remaining on the test filters) during the 10 day sampling period was at 0 test time -

β - 81 millicuries

γ - 40 millicuries

α - 0.023 millicuries

at 1 day test time

β - 58 millicuries

γ - 11 millicuries

α - 0.023 millicuries

Between Filters

Time after sampling days	dis/min/sq. inch β	γ	α
1	9.14×10^3	1×10^3	6
2	7.8×10^3	1×10^3	6
18	4.8×10^3	-------	-

A similar estimate of activity delivered to this test point (by activity caught and still remaining on the test filters) during the 10 day sampling was at a 1 day test time.

β - 52 millicuries

γ - 44 millicuries

α - 0.034 millicuries

1. Pile Cooling Air Pressure Drop (Con't.)

d. Filter House Efficiency Experiments (Con't.)

After Filters

Time after sampling days	dis/min/sq. inch β	γ	α
1	4.8×10^3	3×10^3	0
2	2.9×10^3	2×10^3	--
18	1.9×10^3	------	--

An estimate similar to those above yields for a 1 day test time -

β - 27 millicuries

γ - 16 millicuries

α - 0.0 millicuries

The indicated half-lives from 2 to 18 days are

	β Decay
Before Filters	16 days
Between Filters	23 days
After Filters	26 days

The same conclusions are reached as those given in the Twelfth report, that is:

1. That not very much particulate activity was released from the pile during the period tested.

2. That insufficient activity was collected on the barrier samples to give readings which were enough above background (due to deposition of fission gas decay products) to ascertain a real filter house efficiency. To actually make a filter house efficiency measurement it would be necessary to sample over the period of a slug rupture.

2. 706-D Building Operations

a. Cell Ventilating Air

The 3000 CFM air filter was completed by J. A. Jones, December 31, on schedule. Tests on its performance will be made during the RaLa run scheduled for January 10th.

b. Vessel Vent and Dissolver Vent Lines

A purchase requisition has been issued for 2 experimental stainless steel electrostatic precipitation units made by the Trion Company. These units will first be installed in series to handle both vent lines. The purpose of this first test will be to observe the performance of electrostatic precipitation on this type of service. If successful, this installation would be made permanent and similar units recommended for other similar locations.

c. Additions to Previous Data

In the Eleventh progress report data were given as to the activity of the particles collected. These samples have been observed over a greater length of time and the observed half life over a 5 to 25 day period on all materials was found to be 8 to 12 days.

3. Area Decontamination

The Area Decontamination program is essentially complete. No further reports on progress will be made.

4. Liquid Evaporator - Pilot Scale

The pilot scale evaporator has been dismantled to make room for a waste recovery dock. The final report on this phase of the work will be issued shortly.

A decision to build the large scale evaporator has been made.

5. Synthetic Slug Rupture Experiment

The purposely punctured slugs have been heated to 250° C. in a 70 ft. per second air stream for 1000 hours. Photographs of their current status are attached. The oxide produced in these slugs was very dense and in the form of large flat flakes. It appears to have been largely retained in the slug.

Slug Number 7 was stripped and the oxide separated from the metal and weighed. The slug lost 295 grams, presumably to form 348 grams of U_3O_8. The actual measured amount of oxide remaining in the can was 352 grams indicating no loss to the air stream.

[redacted]

5. Synthetic Slug Rupture Experiment (Con't.)

Considering the possible errors involved, probably less than 10 grams became airborne. The glass wool filter that follows the slugs will be leached and analyzed for uranium to give additional data. Similar weighings will be performed on slugs Number 1 and 8.

This experiment has now been discontinued since the largest of the three ruptured slugs is approximately 2 inches, which is larger than would have been necessary to "freeze" in the 1 3/4" diamond shaped channels of the pile.

6. Particles in the Pile Building

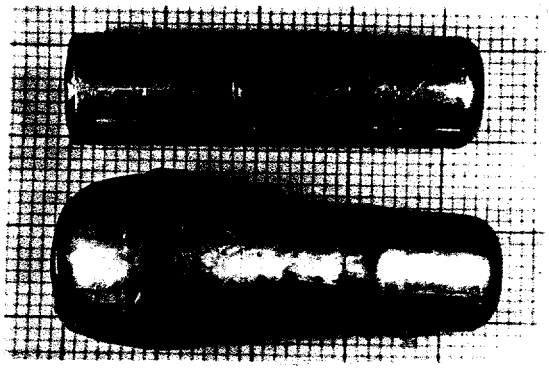
The brush vacuum arrangement installed in the lead shields through which the graphite stringers are discharged from the pile has reduced the number of airborne particles within the working area. The Health Physics Division is at present attempting to evaluate the precautions now in effect but no quantitative figures are available at the present time. The maple rods at the end of the front face plugs give rise to active particles when the plugs are withdrawn from the pile. Consideration is being given to the replacing of these maple rods with aluminum cans filled with paraffin.

C. E. Winters

C. E. Winters

CEW:tks

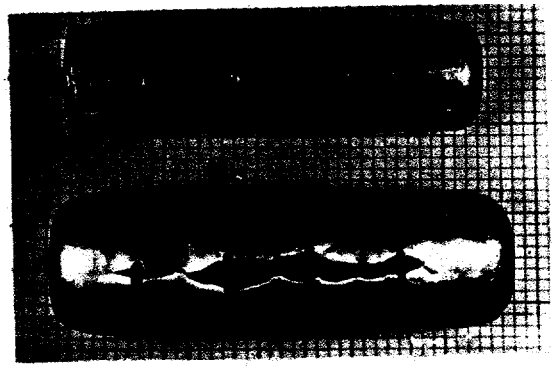
Slugs 1, 8 and 7 after 1000 hours at 250° C.



Slug #1

Max. diameter ~ 2 inches

Slug #8
After 1000 hours at 250° C.



Slug #7
After 1000 hours at 250° C.

Marie that Chiko may get all the back copies of these reports KZM

1479 ... Morgan

[redacted]

Date January 17, 1949

Subject: Fourteenth Progress Report on Oak Ridge National Laboratory Waste Disposal

To: C. N. Rucker

From: C. E. Winters

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TRANSMITTAL DATED 1-20-49

49-1-184

This document consists of 6 pages. No. 30 of 30 copies. Series A.

To: C. N. Rucker

From: C. E. Winters

Subject: Fourteenth Progress Report on Oak Ridge National Laboratory Waste Disposal

This memorandum summarizes the work accomplished during the past two weeks on the waste disposal work of the Laboratory. The Thirteenth report was dated January 3, 1949, Central Files No. 49-1-82.

1. Pile Cooling Air

a. Pressure Drop

The pressure drop across the 105 Building filter house has increased .75" w.g. within the past two weeks. This can be compared to an increase of 1.15" w.g. for the previous two-week period. The following table gives detailed information on the pressure drop data:

	1/2/49	1/13/49	Change
FG #50			
#1 Cell	3.7" w.g.	3.94" w.g.	+0.24" w.g.*
#3 Cell	3.1" w.g.	4.36" w.g.	+1.26" w.g.
CWS #6			
#1 Cell	1.3" w.g.	1.26" w.g.	-0.04" w.g.
#3 Cell	1.25"w.g.	1.22" w.g.	-0.03" w.g.
House	5.9" w.g.	6.65" w.g.	+0.75" w.g.

* Suspected leak in manometer tube

You will notice that the pressure drop through the CWS paper filters has decreased indicative of a decreased air flow due to the plugging of the glass wool filters. Negligible pile power losses can be noticed due to this decreased air flow. At the present time it is anticipated that the glass wool filters will be changed during the first part of February, 1949. At this time FG-25 filter-down will be used as the first layer and backed with a layer of FG-50 instead of using two layers of FG-50. It is hopeful by this change to increase the life of the FG layers, decrease their cost without significantly increasing the plugging rate of the CWS paper filters.

b. Filter Activity

The activity on the FG-50 and CWS #6 filters has remained about constant being approximately 90 mr/hr and 25 mr/hr, respectively, as measured by the ion chamber suspending directly above the installation.

c. Slug Rupture

There have been no ruptured nor swollen slugs since September 25, 1948. The slug mentioned in the last report as being discharged on December 27, 1948, which appeared to have a damaged jacket, has been inspected rather carefully and no hole nor rupture can be detected. The tape radiation instrument is still registering slightly higher than its initial background but has been decreasing steadily for the past week.

2. RaLa Operations

a. General

RaLa run using Hanford Slugs was made during the period January 10th to 16th. Extensive sampling operations were carried out. The following points were sampled:

(1) The dissolver vent line, after passage through two layers of FG-50 filter media.

(2) The vessel vent line, after passage through two layers of FG-50 filter media.

(3) The cell ventilating air before filtering.

(4) The cell ventilating air after passing through two layers of FG-50 filter media plus one layer of CWS #6 paper.

(5) The drainage from the 205 stack during this period.

The sampling procedure on the first four items consisted of drawing a known volume of sample through one thickness of CWS #6 paper. Sampling was continuous except frequent change of paper which in general was made to coincide with change in the nature of the operation in the process.

b. Preliminary Results of Gas Sampling

A preliminary estimate was made of the relative importance of various sources and operations by dividing the electroscope readings on each paper as it came from the sampler, by the approximate fraction of the stream sampled, and the time of sampler operation. These results are plotted on the attached graph with the higher levels noted as to the operation in progress at that time. Quantitative results and detailed evaluation must await the collection and assembly of a rather large amount of data.

c. 205 Stack Drainage

The dissolver and vessel vent lines from both 706-D Building and 205 Building discharge up the 205 stack. During the week sampled the drainage was about 100 cc/minute. The activity of the drainage was negligible gamma and 400 d/min/ml of beta during the early parts of the RaLa run, including the dissolving period. During the latter part of the run, the drainage averaged about 2.5×10^5 d/min/ml. The total drainage amounted to about 100 millicures each of beta and gamma activity. Since this material was captured and dispatched to the tank farm, instead of reaching the atmosphere, this subtraction should be applied when considering the atmospheric polution problem.

3. Particles in the Pile Building

a. Brush Vacuum Arrangement

The brush vacuum arrangement and other precautions being used while materials are discharged from the pile into the operating area has considerably reduced the quantity of airborne activity within the working area. The Health Physics Division has made a number of radiographs of

[redacted]

collected particles and find that the amount of activity is appreciably less than was previously collected. It is estimated that the present methods have reduced the amount of airborne activity by 90 to 95 percent.

b. Isotope Irradiation

The initial work on the development of a chain-driven isotope exposure gadget has been completed. A sprocket chain to which are attached small holders will carry the normal isotope exposure cans into and out of the pile, thus eliminating the necessity of moving large graphite stringers. In this way all dust particles will also be confined to the interior of the pile. It is planned now to build a unit and thoroughly test it before it is installed in Hole 15.

4. Liquid Evaporator

It is expected that the final report covering the experimental phase of the pilot scale evaporator will be issued during the next two-week period as a formal ORNL Report.

C E Winters

C. E. Winters

CEW:lwb

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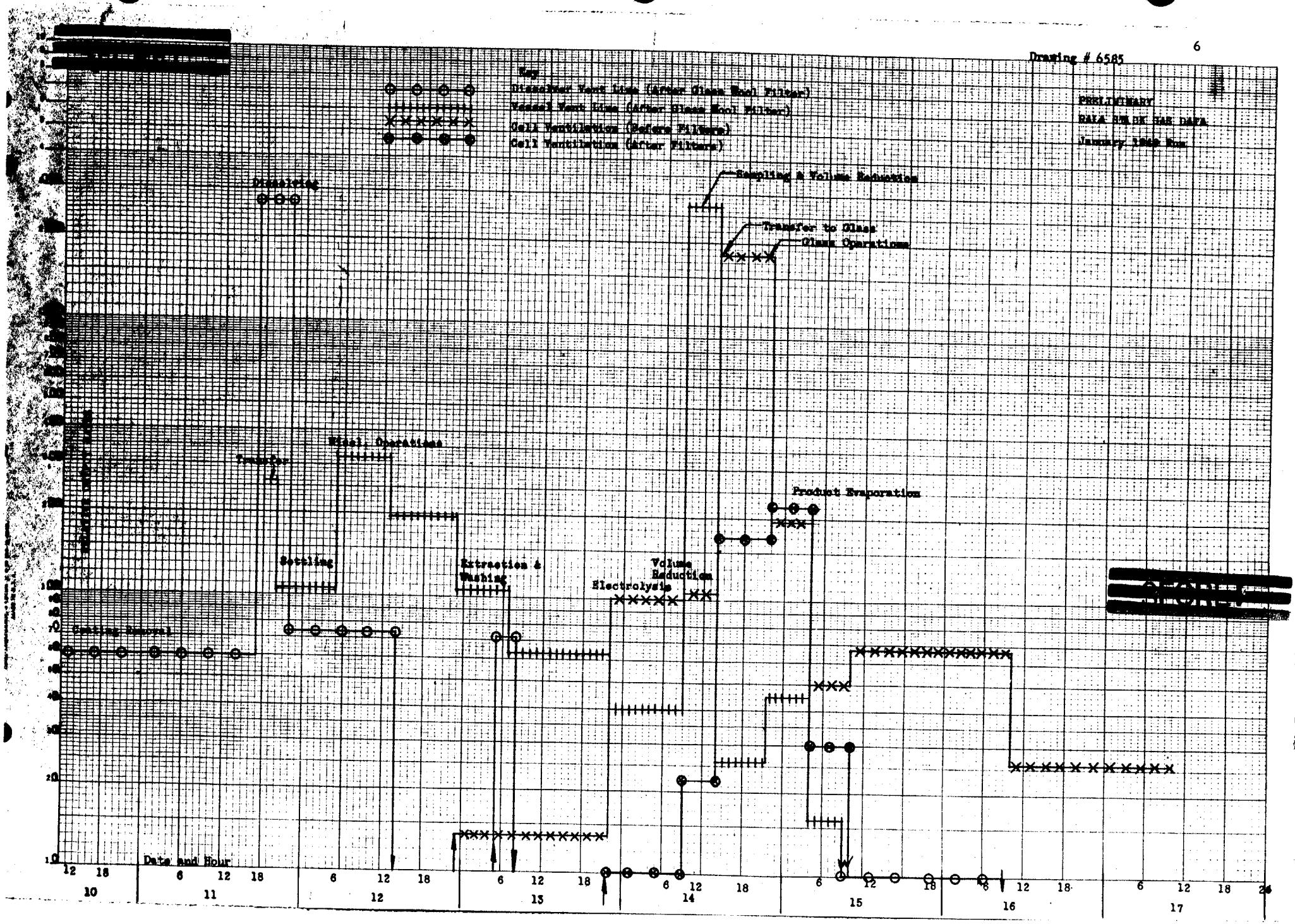
Drawing # 6585



This document consists of 6 pages. No. 19 of 30 copies. Series A.

To: C. N. Rucker

From: C. E. Winters

Subject: Fourteenth Progress Report on Oak Ridge National Laboratory Waste Disposal

This memorandum summarizes the work accomplished during the past two weeks on the waste disposal work of the Laboratory. The Thirteenth report was dated January 3, 1949, Central Files No. 49-1-82.

1. Pile Cooling Air

a. Pressure Drop

The pressure drop across the 105 Building filter house has increased .75" w.g. within the past two weeks. This can be compared to an increase of 1.15" w.g. for the previous two-week period. The following table gives detailed information on the pressure drop data:

	1/2/49	1/13/49	Change
FG #50			
#1 Cell	3.7" w.g.	3.94" w.g.	+0.24" w.g.*
#3 Cell	3.1" w.g.	4.36" w.g.	+1.26" w.g.
CWS #6			
#1 Cell	1.3" w.g.	1.26" w.g.	-0.04" w.g.
#3 Cell	1.25" w.g.	1.22" w.g.	-0.03" w.g.
House	5.9" w.g.	6.65" w.g.	+0.75" w.g.

* Suspected leak in manometer tube

You will notice that the pressure drop through the CWS paper filters has decreased indicative of a decreased air flow due to the plugging of the glass wool filters. Negligible pile power losses can be noticed due to this decreased air flow. At the present time it is anticipated that the glass wool filters will be changed during the first part of February, 1949. At this time FG-25 filter-down will be used as the first layer and backed with a layer of FG-50 instead of using two layers of FG-50. It is hopeful by this change to increase the life of the FG layers, decrease their cost without significantly increasing the plugging rate of the CWS paper filters.

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The activity on the FG-50 and CWS #6 filters has remained about constant being approximately 90 mr/hr and 25 mr/hr, respectively, as measured by the ion chamber suspending directly above the installation.

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There have been no ruptured nor swollen slugs since September 25, 1948. The slug mentioned in the last report as being discharged on December 27, 1948, which appeared to have a damaged jacket, has been inspected rather carefully and no hole nor rupture can be detected. The tape radiation instrument is still registering slightly higher than its initial background but has been decreasing steadily for the past week.

2. RaLa Operations

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(1) The dissolver vent line, after passage through two layers of FG-50 filter media.

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(2) The vessel vent line, after passage through two layers of FG-50 filter media.

(3) The cell ventilating air before filtering.

(4) The cell ventilating air after passing through two layers of FG-50 filter media plus one layer of CWS #6 paper.

(5) The drainage from the 205 stack during this period.

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b. Preliminary Results of Gas Sampling

A preliminary estimate was made of the relative importance of various sources and operations by dividing the electroscope readings on each paper as it came from the sampler, by the approximate fraction of the stream sampled, and the time of sampler operation. These results are plotted on the attached graph with the higher levels noted as to the operation in progress at that time. Quantitative results and detailed evaluation must await the collection and assembly of a rather large amount of data.

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The dissolver and vessel vent lines from both 706-D Building and 205 Building discharge up the 205 stack. During the week sampled the drainage was about 100 cc/minute. The activity of the drainage was negligible gamma and 400 d/min/ml of beta during the early parts of the RaLa run, including the dissolving period. During the latter part of the run, the drainage averaged about 2.5×10^5 d/min/ml. The total drainage amounted to about 100 millicures each of beta and gamma activity. Since this material was captured and dispatched to the tank farm, instead of reaching the atmosphere, this subtraction should be applied when considering the atmospheric polution problem.

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b. Isotope Irradiation

The initial work on the development of a chain-driven isotope exposure gadget has been completed. A sprocket chain to which are attached small holders will carry the normal isotope exposure cans into and out of the pile, thus eliminating the necessity of moving large graphite stringers. In this way all dust particles will also be confined to the interior of the pile. It is planned now to build a unit and thoroughly test it before it is installed in Hole 15.

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It is expected that the final report covering the experimental phase of the pilot scale evaporator will be issued during the next two-week period as a formal ORNL Report.

C. E. Winters

C. E. Winters

CEW:lwb

OAK RIDGE NATIONAL LABORATORY

CENTRAL FILES NUMBER

49-2-76

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Copy # 23-A

Date February 1, 1949

Subject: Fifteenth Progress Report on Oak Ridge National Laboratory Waste Disposal

To: C. N. Rucker

From: C. E. Winters

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2-7-49

To: C. N. Rucker

From: C. E. Winters

Subject: Fifteenth Progress Report on Oak Ridge National Laboratory Waste Disposal

This memorandum summarizes the work accomplished during the past two weeks on the waste disposal work of the Laboratory. The Fourteenth report was dated January 17, 1949, Central Files No. 49-1-184.

1. Pile Cooling Air

a. Pressure Drop

The pressure drop across the 105 Building Filter House has increased .35" w.g. within the past two weeks. This can be compared to an increase of .75" w.g. for the previous two-week period. The following table gives detailed information on the pressure drop data:

	1-13-49	1-27-49	Change
F.G. #50			
#1 Cell	3.94"w.g.	Avg. of 4 cells = 4.72" w.g.	+0.51"
#3 Cell	4.36"w.g.		
C.W.S. #6			
#1 Cell	1.26"w.g.	Avg. of 4 cells = 1.22" w.g.	-0.04"
#3 Cell	1.22"w.g.		
House	6.65"w.g.	7.00" w.g.	+0.35".

Starting with the week of January 24, 1949, the pressure drop data across the individual cells has been recorded as an average of the four cells involved.

b. Slug Rupture

There have been no ruptured nor swollen slugs since September 25, 1948. Last week forty thorium carbonate cans were discharged from the pile because one of the cans seemed to have a suspicious bulge on it when inspected from the front face. Detailed examination of these cans in the canal, however, failed to reveal any damage.

c. Slug Rupture Experiment

On Tuesday, January 18, 1949, a slug having a small hole in the jacket was loaded into the pile in an attempt to evaluate the two new detection instruments located in the exhaust air stream. To date neither of these instruments have detected the presence of this slug with a hole in the jacket, nor has visual observation detected any swelling. So far, the experiment qualitatively confirms the laboratory experiments reported in earlier reports.

2. RaLa Operations

a. General

RaLa Run # 29 was completed on January 16, 1949, and approximately 1,550 curies shipped. The next RaLa run is scheduled to start on February 14, 1949.

b. Activity Discharge From Run # 29

Graphs illustrating the rate of discharge versus time are attached. For the next report, data will be available on the half-lives of the material collected.

(1) Cell Ventilating Air

About 2.5 curies of gamma activity were discharged to the newly installed cell ventilating air filter, and approximately 0.125 curies were found on the downstream side of the filter. This indicates an apparent efficiency of about 95% removal. About 75% of the activity going to the filter occurred during the period when the operations transferred from metal vessels to glassware and during the early glassware operations.

(2) Dissolver-Off Gas Line

About 0.4 curies were found in the line after the glass wool filters. As one might expect, one-half of this total was passed during the initial dissolving operation.

(3) Vessel Vent Line

About 2.5 curies of activity passed the glass wool filters installed in this line. About 65% of this total was during an evaporation step.

c. Plans

It is planned to assign personel to the preparation of recommendations for the revision of the RaLa facilities to increase the output per batch. This study will also include recommendations for such revisions as may be economically feasible to eliminate the generation of particulates during these operations.

3. General Situation on Airborne Activity

It is understood from the Health Physicists that the general area air contamination has been reduced by at least a factor of 10 over that experienced during the latter months of 1948. Now that this initial reduction has been accomplished, it is felt that more detailed studies of the residual contributors may be made, and that means for removing these remaining sources may be installed without resort to emergency methods.

C. E. Winters

CEW/lwb

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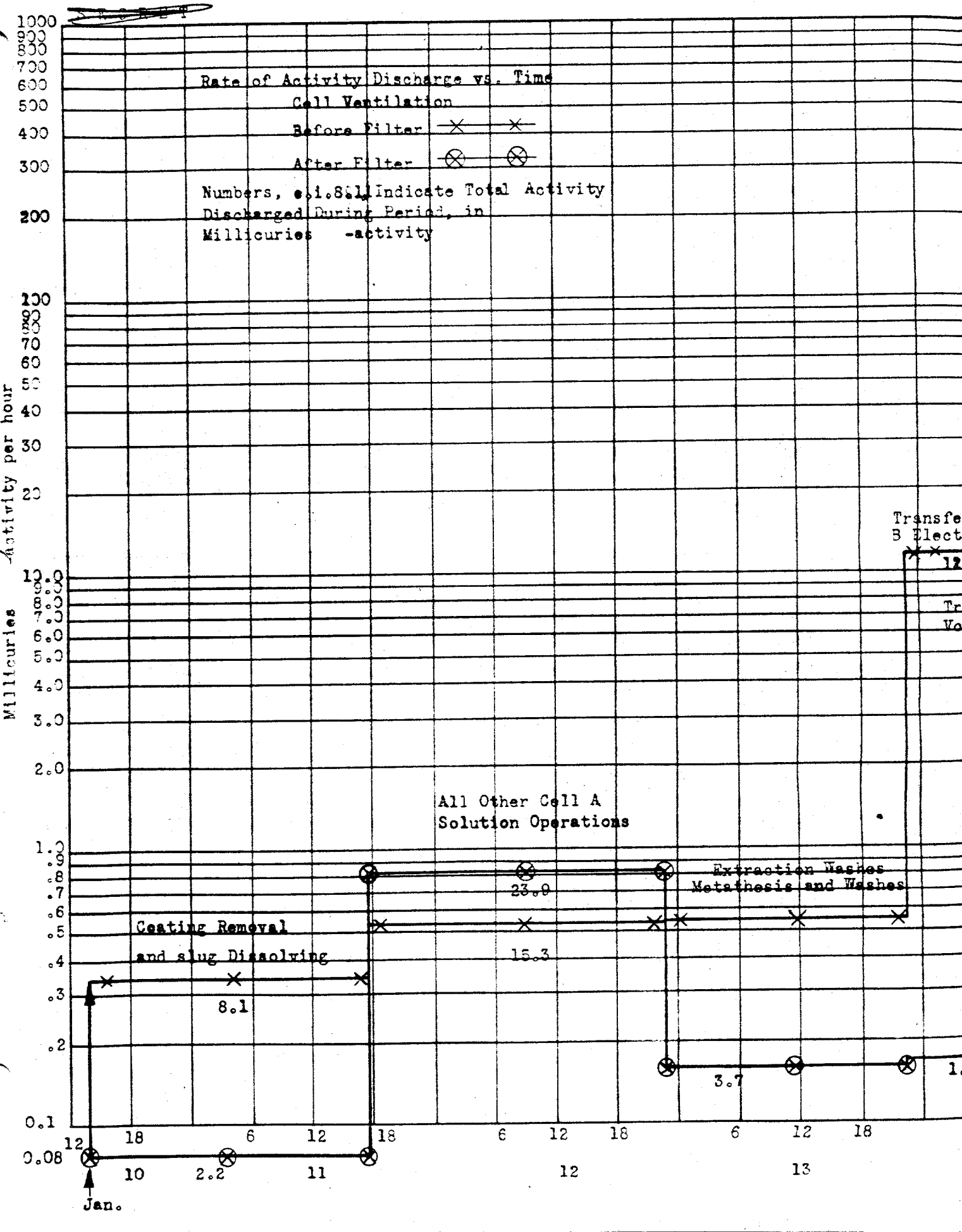
Rate of Activity Discharge vs. Time
Cell Ventilation
Before Filter
After Filter
Numbers, e.i.8.1, Indicate Total Activity Discharged During Period, in Millicuries -activity
Millicuries Activity per hour
1000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
.9
.8
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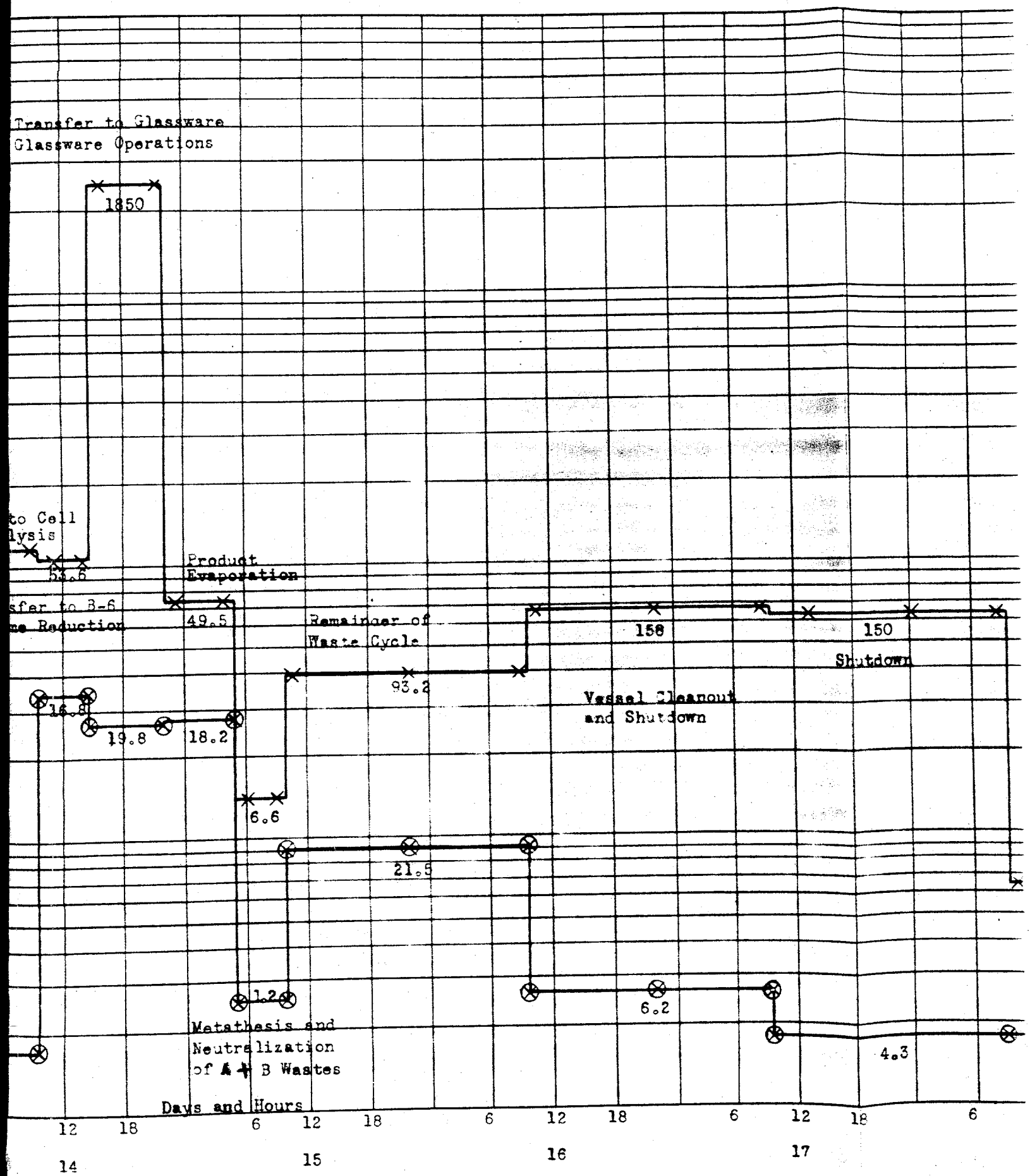
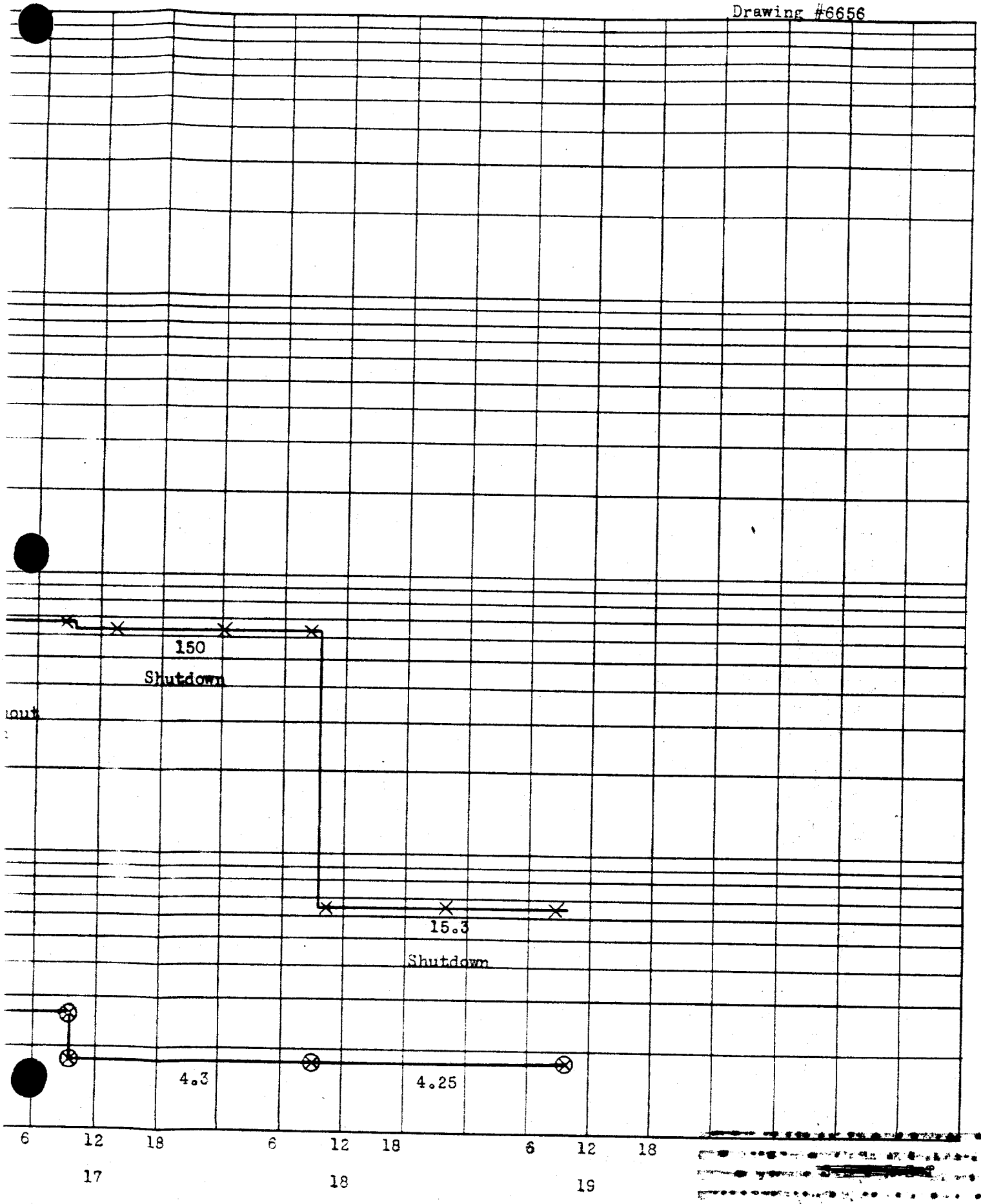
.6
.5
.4
.3
.2
0.1
0.08
All Other Cell A Solution Operations
23.0
15.3
Extraction Washes Metathesis and Washes
3.7
Coating Removal and slug Dissolving
8.1
12
18
6
12
18
6
12
18
6
12
18
10
2.2
11
12
13
Jan.


Transfer to Glassware
Glassware Operations
1850
to Cell
lysis
53.6
Product
Evaporation
sfer to B-6
e Reduction
49.5
Remainder of
Waste Cycle
158
150
Shutdown
93.2
Vessel Cleanout
and Shutdown
16.8
19.8
18.2
6.6
21.5
1.2
6.2
4.3
Metathesis and
Neutralization
of A + B Wastes
Days and Hours
12
18
6
12
18
6
12
18
6
12
18
6
14
15
16
17

Drawing #6656



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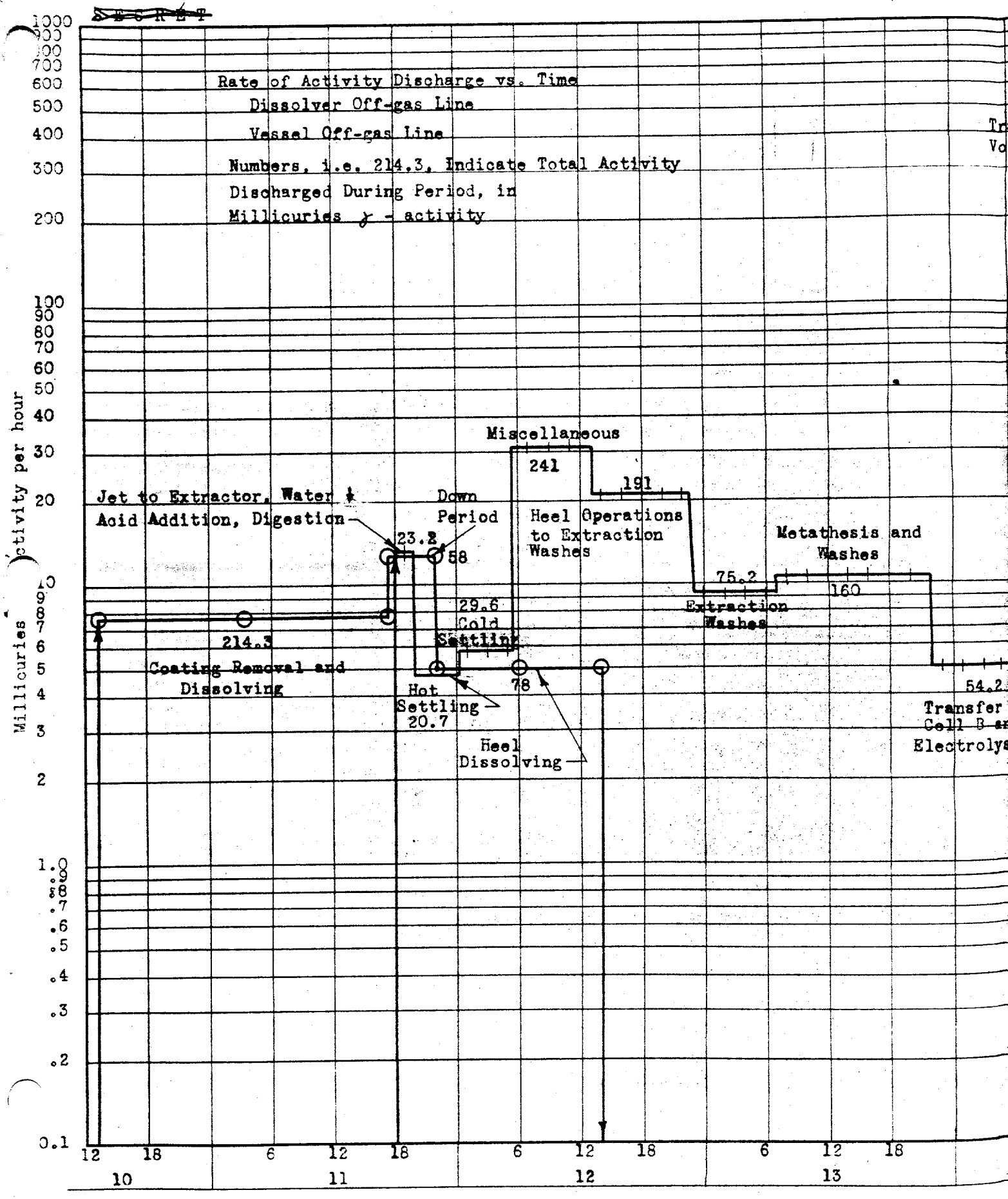
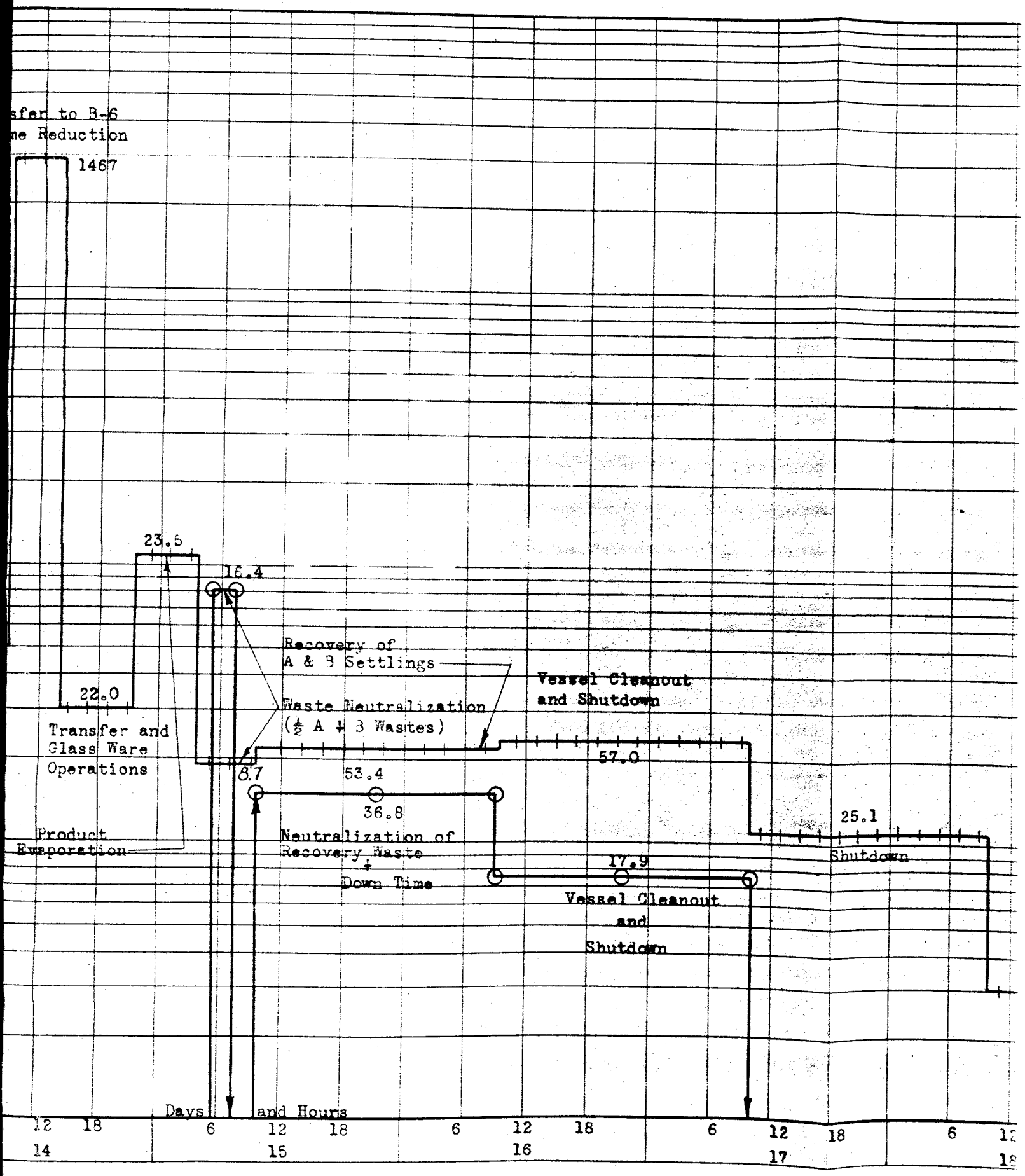
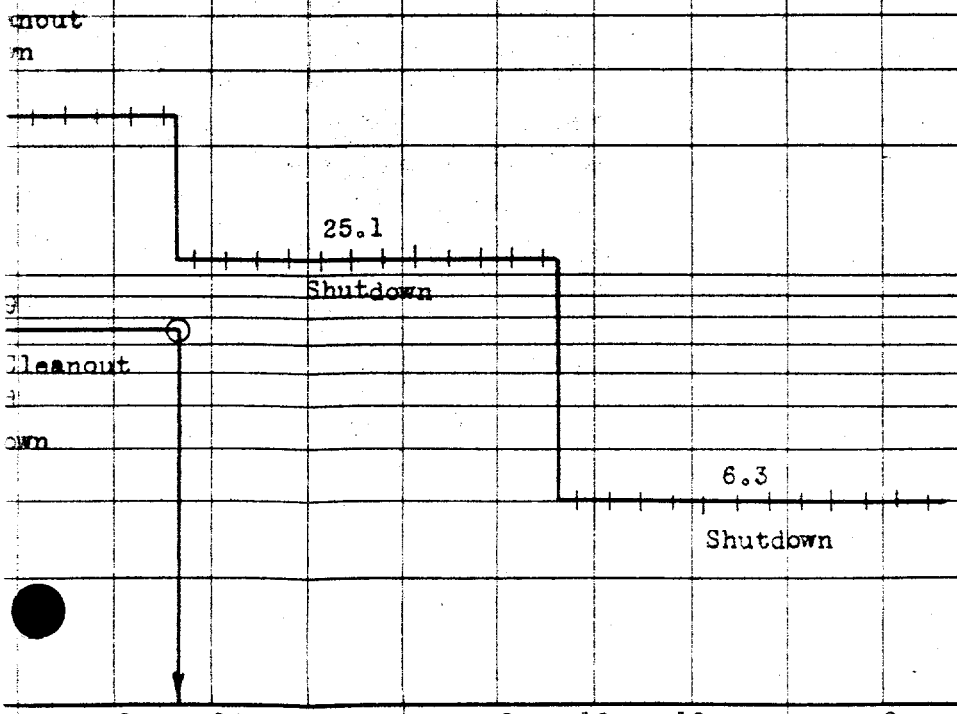

Rate of Activity Discharge vs. Time
Dissolver Off-gas Line
Vessel Off-gas Line
Numbers, i.e. 214.3, Indicate Total Activity Discharged During Period, in Millicuries γ - activity
Millicuries per hour
1000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
10
9
8
7
6
5
4
3
2
1.0
.9
.8
.7
.6
.5
.4
.3
.2
0.1
Miscellaneous
241
191
Jet to Extractor, Water + Acid Addition, Digestion
Down Period
23.2
58
Heel Operations to Extraction Washes
Metathesis and Washes
75.2
160
Extraction Washes
29.6
Cold Settling
214.3
Coating Removal and Dissolving
Hot Settling
20.7
78
54.2
Transfer
Heel Dissolving
12 18 6 12 18 6 12 18 6 12 18
10 11 12 13
Jan.


sfer to B-6
me Reduction
1467
23.5
16.4
Recovery of
A & B Settlings
22.0
Waste Neutralization
(½ A + B Wastes)
Vessel Cleanout
and Shutdown
Transfer and
Glass Ware
Operations
8.7
53.4
57.0
36.8
25.1
Product
Evaporation
Neutralization of
Recovery Waste
+
Down Time
Shutdown
17.9
Vessel Cleanout
and
Shutdown
Days and Hours
12 18 6 12 18 6 12 18 6 12 18 6 12
14 15 16 17 18

Drawing # 6657



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Copy # 23-A

Date February 1, 1949

Subject: Fifteenth Progress Report on Oak Ridge National Laboratory Waste Disposal

To: C. N. Rucker

From: C. E. Winters

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2-7-49

To: C. N. Rucker

From: C. E. Winters

Subject: Fifteenth Progress Report on Oak Ridge National Laboratory Waste Disposal

This memorandum summarizes the work accomplished during the past two weeks on the waste disposal work of the Laboratory. The Fourteenth report was dated January 17, 1949, Central Files No, 49-1-184.

1. Pile Cooling Air

a. Pressure Drop

The pressure drop across the 105 Building Filter House has increased .35" w.g. within the past two weeks. This can be compared to an increase of .75" w.g. for the previous two-week period. The following table gives detailed information on the pressure drop data:

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C. E. Winters

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Attachments

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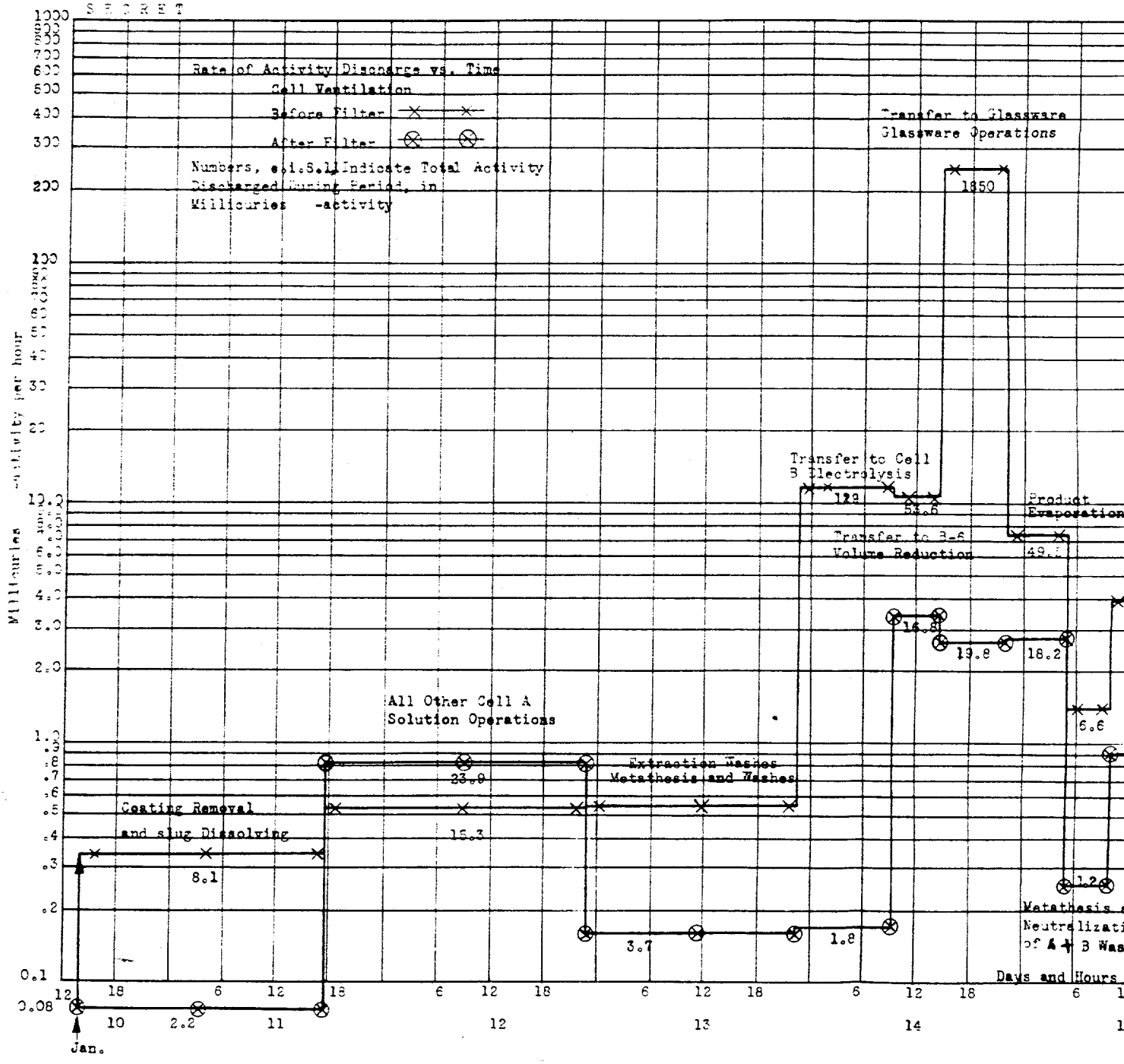
Rate of Activity Discharge vs. Time
Cell Ventilation
Before Filter
After Filter
Numbers, e.g. 8.1, Indicate Total Activity Discharged During Period, in Millicuries -activity
Millicuries -activity per hour
Transfer to Glassware
Glassware Operations
1850
Transfer to Cell B Electrolysis
129
54.6
Product Evaporation
Transfer to B-6 Volume Reduction
49.2
16.8
19.8
18.2
6.6
All Other Cell A Solution Operations
23.9
Extraction Washes Metathesis and Washes
Coating Removal and slug Dissolving
15.3
8.1
3.7
1.8
1.2
Metathesis & Neutralizati
of A + B Was
Days and Hours
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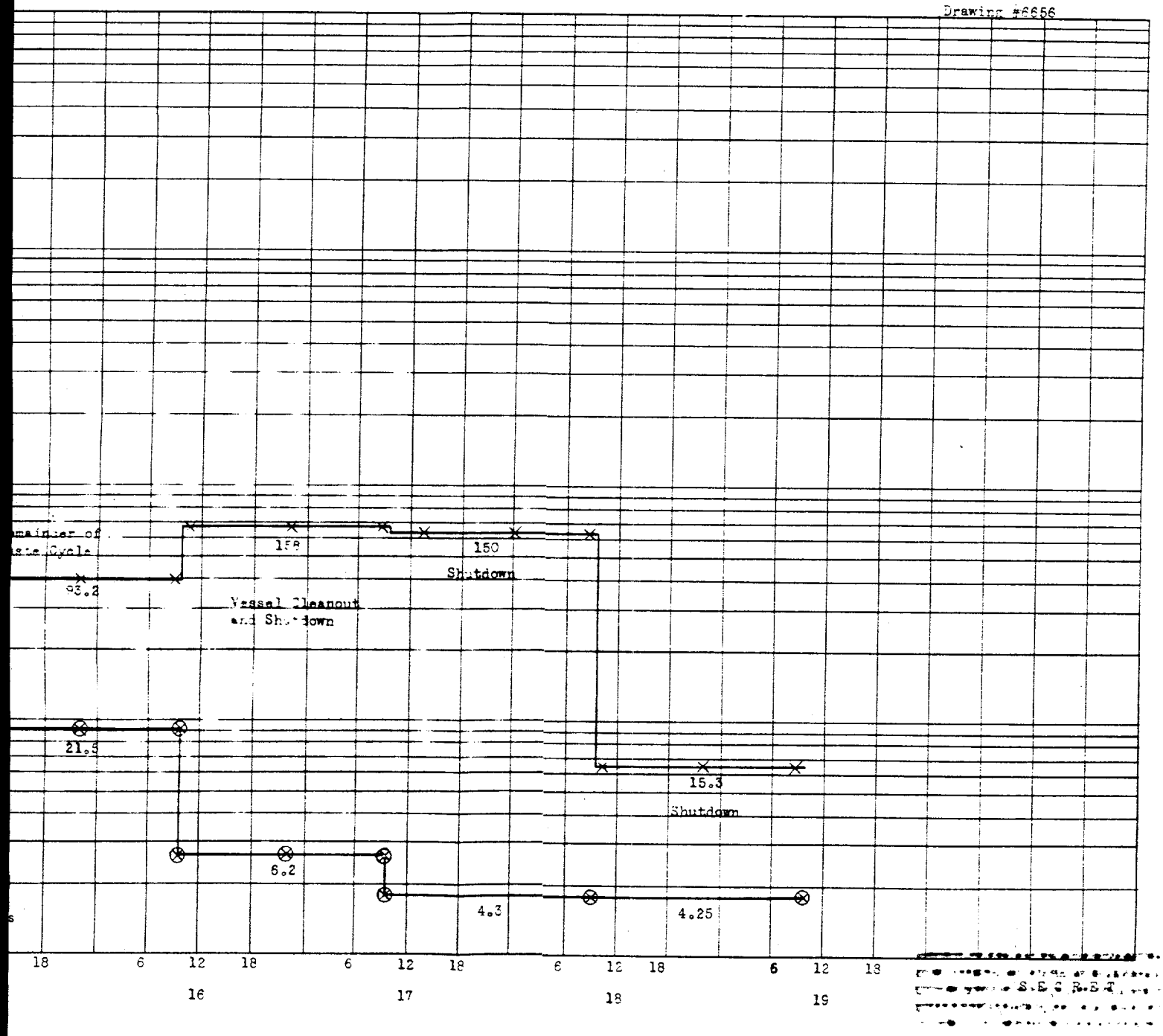
Jan.

Drawing #6656



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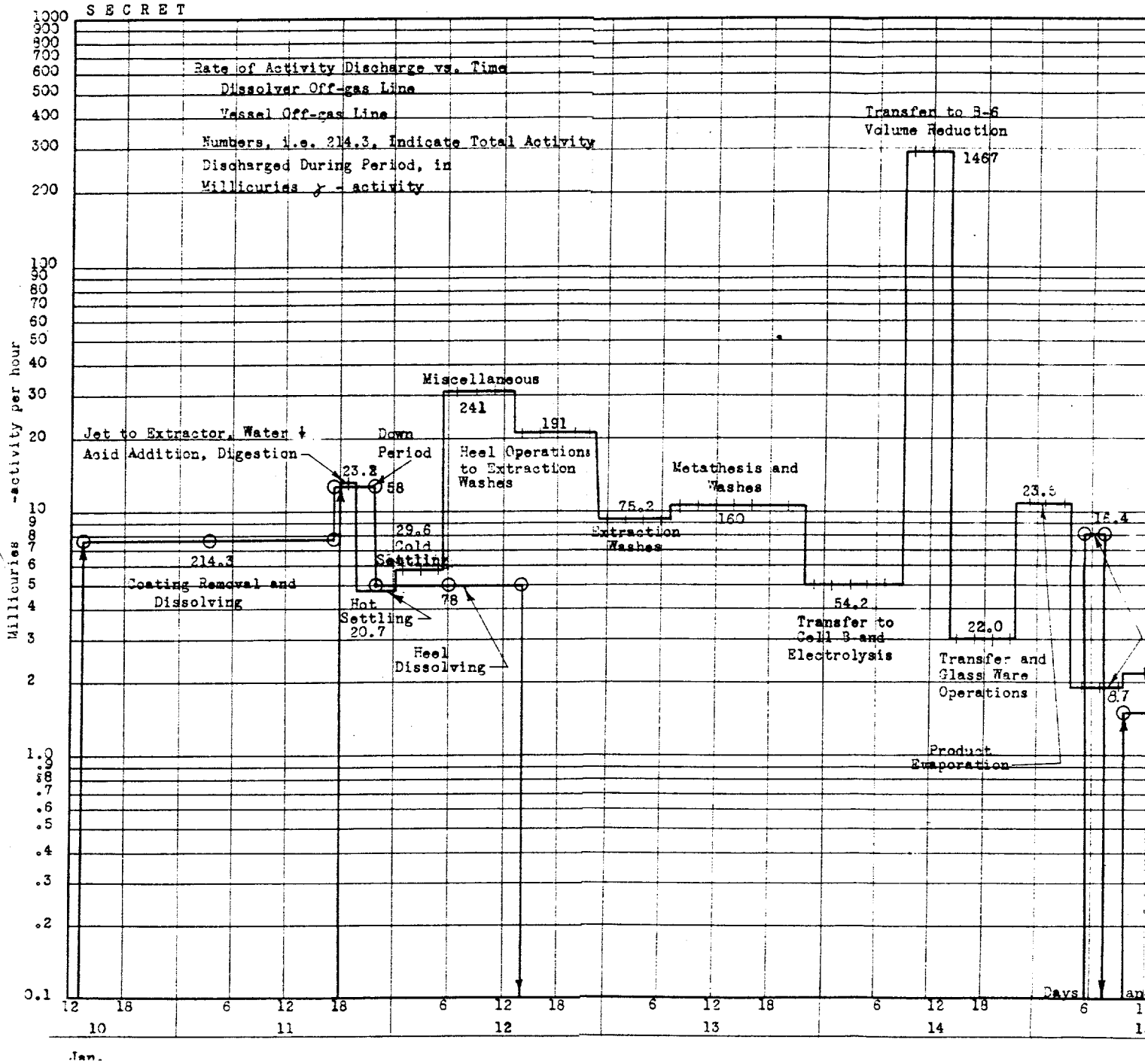
Rate of Activity Discharge vs. Time
Dissolver Off-gas Line
Vessel Off-gas Line
Numbers, i.e. 214.3, Indicate Total Activity Discharged During Period, in Millicuries γ - activity
Millicuries -activity per hour
1000
900
800
700
600
500
400
300
200
100
90
80
70
60
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Product Evaporation
12 18 6 12 18 6 12 18 6 12 18 6 12 18 6 12 18 Days
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Jan.

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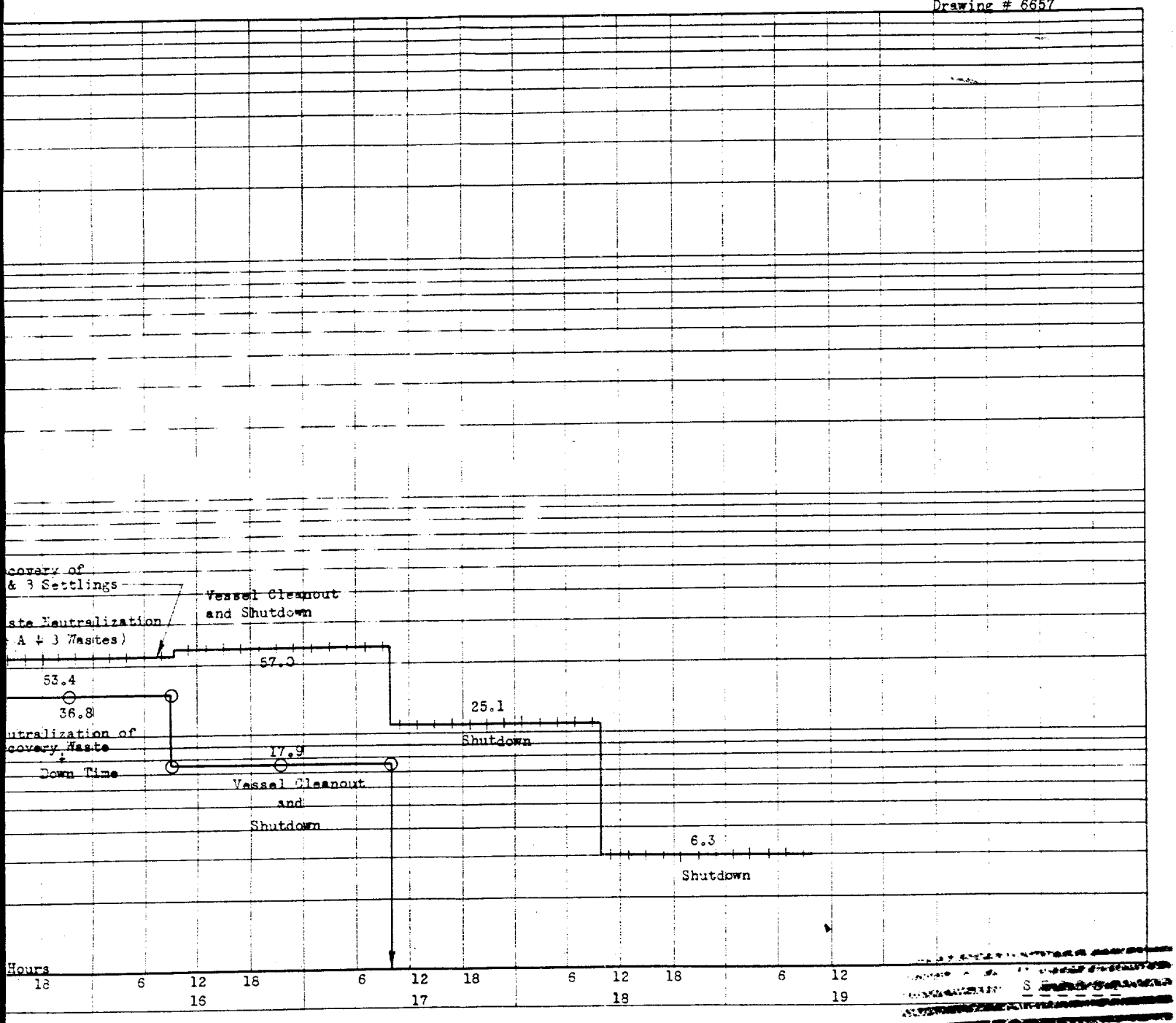

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Date February 15, 1949

Subject: Sixteenth Progress Report on Oak Ridge National Laboratory Waste Disposal

To: C. N. Rucker

From: C. E. Winters

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To: C. N. Rucker

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Subject: Sixteenth Progress Report on Oak Ridge National Laboratory Waste Disposal

Note: Effective with this issue, this memorandum will be issued monthly, with a nominal issue date of the 15th of the month.

This memorandum summarizes the work accomplished during the past two weeks on the waste disposal work of the Laboratory. The Fifteenth report was dated February 1, 1949, Central Files No. 49-2-76.

1. Pile Cooling Air

a. Pressure Drop

The pressure drop across the 105 Building Filter House has increased 0.35" w.g. within the past two weeks. This can be compared to an increase of 0.35" w.g. for the previous two-week period. The following table gives detailed information on the pressure drop data:

Location	1-27-49	2-10-49	Change
F.G. #50	4.72" w.g.	5.00" w.g.	∕0.28" w.g.
C.W.S. #6	1.22" w.g.	1.31" w.g.	∕0.09" w.g.
TOTAL FILTER HOUSE	7.00" w.g.	7.35" w.g.	∕0.35" w.g.

In view of the nominal pressure increases recently experienced, together with the fact that it has not been necessary to reduce the pile power, filter changes have been deferred until such time as a significant reduction in power is necessary.

b. Slug Rupture

There has been no ruptured nor swollen slugs since September 25, 1948.

c. Slug Rupture Experiment

The slug having a small hole in its jacket that was inserted into the pile on January 18, 1949, has ruptured sufficiently so that its presence is shown on the gummed tape and the oil-soaked cotton pad. The detection instrument based on monitoring gaseous fission product decay into radioactive solid particles has not indicated the rupture. The presence of the ruptured slug is detectable by visual inspection and by the scanner.

d. Filter House Activity

No appreciable increase in the activity accumulation on either the F.G. #50 or C.W.S. #6 filters has occurred during the past two-week period.

2. RaLa Operations

a. For the last two reports, the activity throughput of each 706-D off-gas line was reported on a preliminary basis; first, by the electroscope readings taken on the sampling filter papers, and secondly, by the gamma counts taken on aliquot portions of the sampling filter papers. The data were further reduced to each individual operation contributing to each line.

b. New Information

Decay curves on all samples have been completed to the limit of accuracy of the gamma counting instrument. The attached Table I carries three columns of resulting figures.

The first column carries the summed gamma activities for each line for both the run proper and for the noted period after the run. These individual values were obtained for each operation sample within 1 to 4 hours after the operation and represent both short-life and long-life activities.

The second column carries the summed longer-life gamma activities obtained by extrapolating the individual decay-curves back to time zero after straight line decays were obtained.

The third column carried the approximate mean half-lives for each group of summed activities. Time has not permitted an accurate development of this data.

It is well to note at this point the operations for each line exhibiting peak long-life activity and the half-lives resulting for that particular gamma discharge. (Table II).

Table I

	Short & Long Life * Gamma Millicuries	Long Life** Gamma at t = o Millicuries	Half Life*** Gamma
Dissolver-Gas Line			
Run Proper	420	370	14½ D
Line Sweep out	---	Not Obtained	---
Vessel Off-Gas Line			
Run Proper	2400	2300	8½ D
Line Sweep out for 15 days	280	95	9 D
Cell Vent Line-Before Filter			
Run Proper	2400	1100	15½ D
Line Sweep out for 14 days	340	380****	20 D
Cell Vent Line-After Filter			
Run Proper	120	200	5½ D
Line Sweep out for 14 days	45	35	12 D

* Counts made within 4 hours after completion of sampling.

** Extrapolation back to time o after each decay curve exhibited straight line tendencies.

*** Weighted mean of the individual half-lives using the long-life, time o, values.

**** 225 millicuries of this was during first 3 days after shutdown.

Table II

Dissolver Off-Gas Line	Slug Dissolving	140 millicuries	17½ D
Vessel Off-Gas Line	Transfer to B-6 Sampling Vol. Reduction	1400 millicuries	9 D
Cell Vent - Before Filter	Transfer to Glassware Glassware Operations	290 millicuries	13 D
Cell Vent - After Filter	Transfer to B-6 Vol. Reduction	60 millicuries	9 D

Table III

	Cyclone	Paper
Dissolver Line - Run Proper	3.6%	96.4%
Vessel Line - Run Proper	1.8%	98.2%
Shut-Down	13.9%* **	86.1%
Cell Vent Line-Before Filter Run Proper	5.2% ***	94.7%
Shut-Down	89.5% * **	10.5%
Cell Vent Line-After Filter Run Proper	3.5%	96.5%
Shut-Down	5.7% *	94.3%

* These values cover but 3 days of shut-down.

** The ratio of jar contributions to paper contributions was rising in each of these cases when the taking of jar samples was stopped.

*** The bulk of the jar activity represented here was picked up during clean-out operations.

c. Comments and Discussion

Several facts of interest should be noted. First, many of the decay curves exhibited growth in gamma emissions, at time to considerable proportions. For the Dissolver and Vessel Off-Gas Lines, these growths were fairly well balanced by more or less normal decays in other specimens so that the long-life activities compare to the total activities on an approximate 1 to 1 ratio.

The Cell Vent samples taken before the filter in general exhibited growth except for the peak sample and a few others. The peak sample showed a rapid decay before a single component type decay curve was obtained. The initial count for this peak period gave a discharge value of 1900 millicuries of γ activity; compare this value with the time zero, long-life value of 290 millicuries listed in Table II.

The Cell Vent samples taken after the filter exhibited a consistent growth in γ activities before decay started, indicating that parents of, rather than γ emitters, were themselves being removed by the sampling apparatus.

It is interesting to note the proportion of activity picked up by the cyclones and the filter papers.

As a matter of interest, it can be shown from the data herein presented and for this particular run, that if the Cell Ventilation Filter were not installed, the Cell Ventilation line would represent a greater hazard during shutdown than during RaLa operations from the viewpoint of possible area contamination by particulate matter.

As a first approximation, it could be considered that non-Brownian particles are collected largely in the cyclone receiver. The non-Brownian particulate matter removed during actucal operations by the cyclone was about 10 millicuries per day of longer-lived material*. During the three-day period immediately following the run, the non-Brownian particulate matter removed was about 110 millicuries per day of longer-lived material**.

Note too, that while the particulate concentration, relative and absolute, of the Cell Vent stream ahead of the filter increased after the run proper, the relative concentration after the filter remained about the same (3.5% to 5.7% - the spread is beyond the accuracy of measurement at the low absolute activity levels)while the absolute concentration decreased***.

These data fully support the conclusion that the installed filter house on the Cell Vent line is significantly reducing the area contamination.

* - From Table I, total long-lived material through-put was 1100 millicuries during run. From Table III, fraction removed by cyclone is .052. Approximate run time is 6 days.

$$\frac{1100}{6} \times .052 = 10 \text{ millicuries per day}$$

** - From Table I and Table III, total long-lived material through-put was 380 millicuries during the 3 days following the run.

$$\frac{380}{3} \times .895 = 110 \text{ millicuries per day}$$

***- $200 \times \frac{1}{6} \times .035 \approx 1$ millicuries per day versus about

$35 \times \frac{1}{3} \times .057 \approx 0.7$ millicuries per day.

C. E. Winters

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Date March 15, 1949

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To: C. N. Rucker

From: C. E. Winters

Subject: Seventeenth Progress Report on Oak Ridge National Laboratory Waste Disposal

This memorandum summarizes the work accomplished during the past month on the waste disposal work of the Laboratory. The Sixteenth Progress Report was dated February 15, 1949, Central Files No. 49-2-182.

1. Pile Cooling Air

a. Pressure Drop

The pressure drop across the 105 Building Filter House has increased 0.45" w.g. within the past month. This figure can be compared to an increase of .7" w.g. for the previous month. The following table gives detailed information on this data:

Location	2-15-49	3-14-49	Change
F.G. #50 Filters	5.2" w.g.	5.4" w.g.	↑ 4%
C.W.S. #6 Filters	1.3" w.g.	1.4" w.g.	↑ 8%
ACROSS FILTER HOUSE	7.4" w.g.	7.85" w.g.	↑ 6%

A graph illustrating the filter pressure drop experience since their installation is attached as Figure I.

If the rate of pressure rise continues to be as favorable as at present, it may not be necessary to change the filter media before the warmer weather causes the pile power to be reduced to avoid exceeding the maximum slug temperature. At the present time, the observed air flow through the pile is about 6% less than it was last November before the installation of the Filter House.

b. Slug Rupture

Visual scanning of the pile located a ruptured slug in Channel 1360 on February 16, 1949. This was the first rupture since September 25, 1948. It had been exposed for 1,622 days at an approximate temperature of 175°C. The aluminum jacket of the slug was split at the point of the weld due to the formation of uranium oxide. No difficulty was encountered during the discharge operation.

c. Slug Rupture Experiment

The slug with a known hole in the jacket loaded into the pile on January 18, 1949, finally ruptured and was discharged on February 11, 1949. This slug had a hole in the aluminum jacket approximately 0.03" in diameter. It was loaded into the pile in an attempt to evaluate the activity detection instruments. The results of this experiment indicate that the most positive method of detection is still the routine visual inspection. More details of the action of the various instruments are contained in the Operations Division Monthly Report for February, 1949, Report ORNL-320.

d. Filter House Activity

The ionization chambers located directly above the filters in the exhaust air system show no appreciable increase in the activity of the material deposited in the Filter House.

e. Pocket Removal - Pile Filter House

On February 16, 1949, an FG-50 filter pocket was removed from the Pile Filter House after 90 days of effective operation. To date, some 33 grams of dust have been shaken from the filter material (3.3 grams per square foot) indicating our previous estimates of 1 gram per square foot are low. This dust will be analyzed.

2. RaLa Operations

The next run is scheduled for March 20, 1949. No sampling activities are planned for this run.

706-C A-16
=706-D A-16
= VOG

S[redacted]

3. 706-C Operations

a. Iodine 135 - Xenon 135 Runs

Run #11 dissolving X-10 slugs was sampled completely using either CWS paper filters alone or such filters in combination with cyclones. The results are reported in Table I and are based on counts made within 20 minutes after the completion of sampling. The values represent the "short-term plus long-term" contamination potentials. The overall time of the run, less clean-up, was about eight hours.

Table I

Sample Period	Line Discharges*			
	Vessel Off-Gas Line(A-16)**		Cell Ventilation**	
	Total	Per Hour	Total	Per Hour
Slug Dissolving	110	67	0.03	0.02
Transfer, Oxidation and Distillation	2900	1200	34	14
Precipitation	290	230	10.5	9.2
Centrifuging	340	350	115	118
Waste Dumping, Dismantling and Clean-up	160	55	11	3.7
Total	3800	410	170	18

* - All values are reported as millicuries of β^- emitters of 1 MEV energy, one gamma per disintegration.

** - Uncertainties are probably about ± 20%.

The A-16 line discharge is all contained and is finally discharged through the 205 stack without filtering. It is difficult to ascribe any local air contamination (Buildings 706-D and 706-C) to the A-16 output.

The Cell Vent discharges, which lead directly to the air through 12 ft. stacks on the roof, were quite high, equalling in magnitude during Periods 2 and 3 the maximum hourly rates ever obtained from D Building Cell Vent Line. In Period 4, the hourly rate was greater than D Buildings Cell Vent maximum by an order of magnitude.

[redacted]

true for 706D too?

Whether or not this level of Cell Vent discharge would have caused a repetition of previous air contamination troubles had climatic conditions been different is a moot question. The day was bright and cool which, with the black roof, probably resulted in thermal air currents tending to carry the vent discharges up high enough for dispersion by the moderate breezes. Certainly the rain-caps over the cell vents are a very poor design for dispersal of fumes since the fumes are directed downward on the roof thereby. An order has been issued for the removal of these rain-caps.

The total amount of activity discharged from this particular Xenon 135 run is nearly the same as has been obtained on previous RaLa runs after the RaLa filters were installed. One significant difference, however, is that the activity in the Xenon runs was discharged over an eight-hour period rather than over five days as is the case for RaLa. Under these circumstances, it is questionable whether this operation should continue operations with X-10 slugs without the benefits of decontamination of the waste gases, and certainly no repetition of the Hanford Slug runs should be planned at this time.

b. Iodine 131 Run

Iodine 135 is prepared for the radioisotope trade through the dissolving of X-10 slugs in acid in a manner quite similar to that of the RaLa and Xenon 135 runs.

Run #38 was sampled completely using either CWS paper filters alone or such filters in combination with cyclones. The results are reported in Table II and are based on counts made within 20 minutes after the completion of sampling. The values represent the "short-term plus long-term" contamination potentials. The overall time of the run, less clean-up, was about 3-1/2 days.

Table II

Sample Period	Line Discharges*			
	Vessel Off-Gas Line(A-16)**		Cell Ventilation**	
	Total	Per Hour	Total	Per Hour
Dissolving	0.36	0.02	1.7	0.09
Steam Sparge	0.23	0.06	0.52	0.14
Distillations Initial Evap.-Rm 10	0.16	0.01	1.8	0.09
Room 10 Oper.;Glassware; Final Evap.	5.94***	0.5***	8.4	0.54
Room 10 Oper.	--	--	0.64****	0.03
Rom 10 Oper.	--	--	0.65****	0.06
Total	6.7	-	13.7	-

* -All Values are reported as millicuries of α emitters of 1 MEV energy, on gamma per disintegration.

** -Uncertainties are probably about $\pm$ 20%.

*** -Includes both Cell and Room 10 vessel off-gases.

**** -Values are for the separate Room 10 ventilation system.

These low values indicate that 131 Iodine runs contribute little to area contamination.

c. Comparison of Iodine and Xenon Runs

It is interesting to compare the Iodine and Xenon runs. This is done in Table III.

[redacted]

Table III

	Uranium Dissolved	Slug Irrad. Time	Cooling Time	Dissolv. Acid	Activity of Vessel Vent Lines	Activity of Cell Vent Lines	Trap on Vent Lines
Iodine 131	3 slugs	30-60 days	10-12 hrs	HNO_3	7 mc.	14 mc.	Yes
Xenon 135	6 slugs	1 day	2 hours	HCl	3800 mc.	170 mc.	No

4. Plans for 706-C, 706-D and the New Isotope Area Waste Gas Decontamination

The present thoughts on decontamination and disposal of these various waste gas streams is as follows:

a. Hot Vacuum System

It is proposed to combine all dissolver and vessel vent lines for 706-D, 706-C, the Isotope area and possibly 205 into one common decontamination system. The gas would then flow through two Cottrell-type precipitators in a series or parallel arrangement, then through two cells of FG-50 and possibly CWS #6 paper in parallel. Duplicate blowers rated at 2000 CFM and 50 inches of water vacuum, one electric and one steam driven would be provided to compress the gases to atmospheric pressure and discharge to the new 250 ft. Isotope area stack.

b. Decontaminated Air System

It is proposed to collect in a common duct the cell ventilating air from 706-C and 706-D. This would be decontaminated by Trion-type electrostatic precipitators followed by FG-50 and CWS #6 paper. This would then be discharged into the new Isotope area stack.

c. Hood Air System

Hood air from 706-C and 706-D, and the Isotope area will be discharged to the new stack until such time as measurements indicate there is sufficient activity in this air to warrant decontamination.

The status of the above plans are that engineering drawings are being prepared in accordance with the plan; however, actual procurement of sufficient quantities of both type of precipitators await the completion of further feasibility studies in cooperation with the manufacturers.

C. E. Winters

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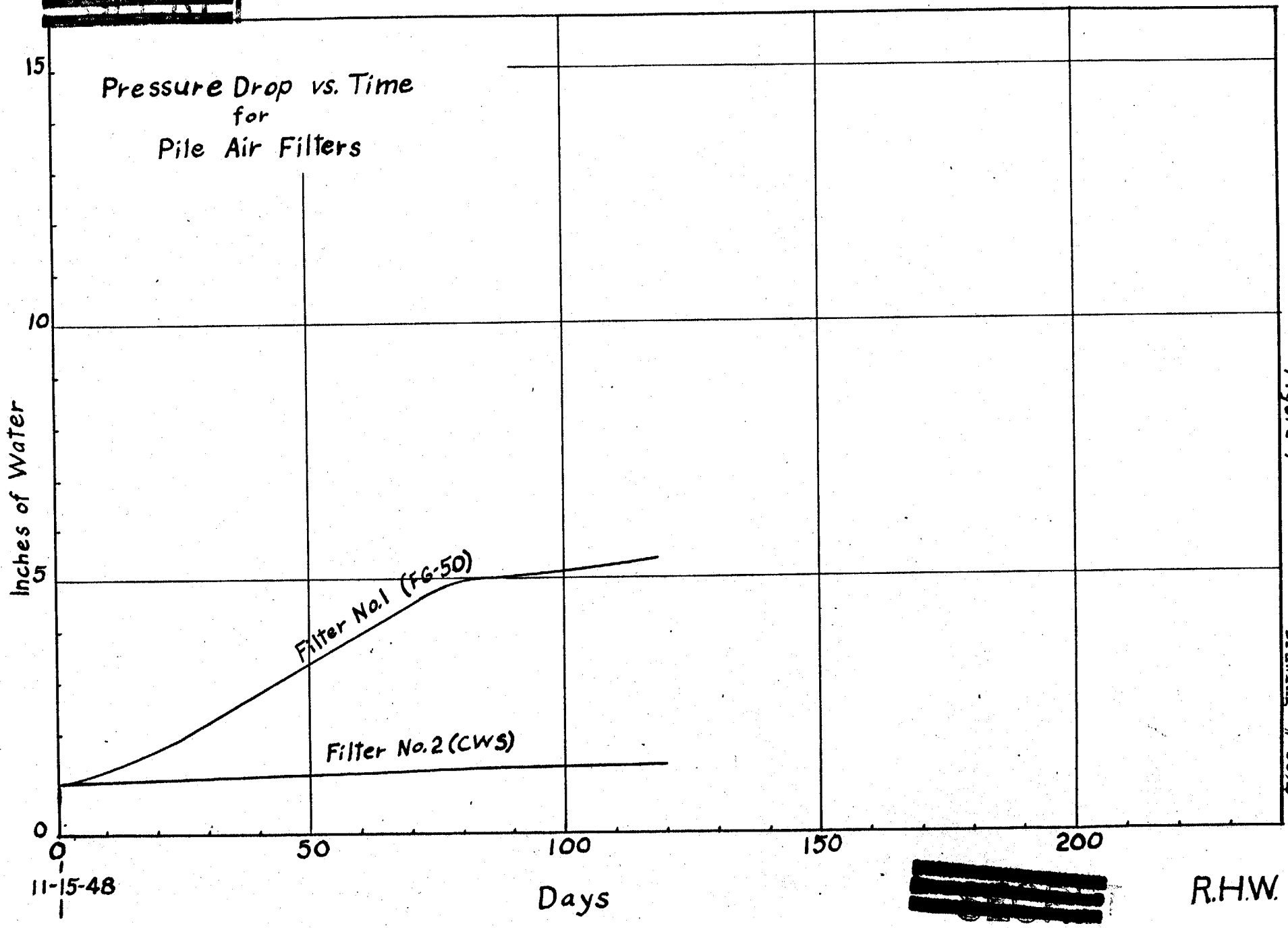
Pressure Drop vs. Time
for
Pile Air Filters
Inches of Water
15
10
5
0
Filter No.1 (FG-50)
Filter No.2 (CWS)
0
50
100
150
200
11-15-48
Days
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Figure 1
Drawing # 6894

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From: C. E. Winters

Subject: Eighteenth Progress Report on Oak Ridge National Laboratory Waste Disposal

This memorandum summarizes the work accomplished during the past month on the waste disposal work of the Laboratory. The Seventeenth Progress Report was dated March 15, 1949, Central Files No. 49-3-195.

1. Pile Cooling Air

a. Pressure Drop

On April 2nd, the canal developed a leak of about 70 gallons of water per hour into No. 3 American Filter Cell, and on April 4th, the 15 pockets were removed to repair the leak. These pockets were replaced with 15 new pockets loaded with a layer of FG-25, backed with a layer of FG-50. As a result of this change the pressure drop across the Filter House decreased 0.95" w.g. The following table gives detailed information on this data:

Location	3-14-49	4-14-49	Change
FG #50 Filters	5.4" w.g.	4.7" w.g.	-13%
C.W.S. #6 Filters	1.4" w.g.	1.5" w.g.	+ 7%
ACROSS FILTER HOUSE	7.85"w.g.	6.80"w.g.	-13%

b. Slug Rupture

A ruptured slug was located by visual scanning in Channel 2276 on April 5, 1949. It was discharged without any difficulty. It had been in the pile for 1,637 days at an approximate temperature of 190° C.

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c. Filter House Activity

The ionization chambers located directly above the filters in the exhaust air system did not show any appreciable increase in the activity of the material deposited in the Filter House during the month.

d. Pocket Removal - Pile Filter House

The FG-50 filter pocket referred to in paragraph 1. e in the last report, yielded further information. By chemical analyses and gamma radiation analyses, it was determined that some 18 grams of dust remained in the glass wool, making the total dust per pocket about 50 grams or 30 kg for the whole installation.

Random information from analyses includes (for the entire installation):

1) Approximately 900 grams of U in the FG-50 dust.

2) Plutonium activity was reported as 6 x 10^7 α disintegrations per minute.

3) β counts indicated the FG-50 filters carry 150 millicuries of β emitters as measured some 24 hours after exposure.

4) α counts, converted to α photons of 1 MEV indicated some 44 millicuries of α emitters as measured some 24 hours after exposure.

5) Spectrographic analysis duplicated a similar analysis for dust from a pocket removed earlier. Pertinent concentrations were Al - very weak, Ca - very strong, Mg - strong, Na - moderate, Si - very weak plus.

6) Effective pocket exposure time was 90 days.

e. Life Test - Filter House Duplicate

Test equipment containing filter media on a pattern duplicating the filters in the 105 Building Air Filter House has operated since October 22, 1948. Initial ΔP across the first FG-50 layer was 0.4" w.g., and is now 4.7" w.g.; the current rate of increase is 0.025" w.g. per day. Pressure drop across the second FG-50 layer and across the CWS paper has not increased significantly.

The attached graph illustrates the pressure drop experience since the test equipment start-up. When comparing this experience with the Filter House experience, consider:

1) Specific flows in the test equipment are about twice the Filter House flows.

2) The sample point is ahead of the cooling water sprays.

f. Filter Media Efficiency Test

Three filters sampling pile discharge air ahead of the cooling water sprays were mounted in series. The materials were K-25 barrier, K-25 basesheet and K-25 barrier in that order. The filters are preceded by an aerotec cyclone. Gamma and Beta burdens, reported as millicuries per total stream are listed for each filter and the cyclone in Table I. The equipment was in the stream for 60 calendar days.

TABLE I

	γ (1 MEV/photon)	β
Cyclone	224	No Value
First Barrier	252	221
Base Sheet	51	47
Second Barrier	91	66

Half-lives after about 3 days were in general about 17 days except for the cyclone material which indicates about 30 days.

Incidental information includes:

1) Dust burden on the first barrier was 0.39 mg. per square inch or 180 mg. for the total barrier. For comparison, the values of 900 mg. for the filter versus about 750 mg. for the cyclone.

2) Specific activities of the two dusts reported in (1) are 0.055 and 0.06 microcuries per mg. for barrier and cyclone dust respectively.

3) No material was present on the second and third filters that could be removed by any one of several techniques tried.

The apparent anomaly of the second and third filters carrying such relatively high activity levels despite seeing only the gas already filtered by the very excellent barrier filter first in the series may result from adsorption of decaying gases by the activated structures of the filter materials.

2. RaLa Operations

During the RaLa run started on March 19, 1949, it was found that the bulk of the high air contamination encountered in recent runs was due to vessel vent fan housing drains and vessel vent fan housing leaks. Installation of valves on drains and operation of a standby fan instead of the vessel vent fan eliminated these sources. It is suspected that the sampling equipment perhaps may be a small contributor. It will be investigated during the next RaLa run.

3. Fume Line Sampling - 706-C Operations

a. Iodine 131 Operations

Run #39 was sampled completely. Results checked those obtained from Run #38 and reported in the last report (March 15, 1949). No further work is presently planned.

b. Iodine 135 Operations

Run #11 was sampled from the cell ventilation line only. This run was a "double-header", with twice the usual number of slugs being dissolved in two batches. As was anticipated, activity discharge levels were about twice the previous run except for the centrifuging operation. This operation, which had been the major contributor on Run #10, decreased its activity level by a factor of 6. Inquiry revealed that pipette decantation alcohol washes of the centrifuge cake, used with Run #10, were omitted with Run #11. No further work is presently planned.

4. Fume Line Sampling - Hot Pilot Plant Operations

a. Dissolver Off-Gas Line

For the final 30% Hanford level dissolving, the total out-put over 1-2/3 days was 210 millicuries of γ active material (1 MEV per photon). A total

[redacted]

of 17 liters of solution containing 190 millicuries of α active material was collected.

b. Vessel Off-Gas Line

For the first six days of the run, about 780 millicuries of β active material (1 MEV per photon) was discharged. The run is still in progress. No condensate was collected.

c. Cell Ventilation Line

Activity levels here are so low as to be considered of no consequence.

C. E. Winters

C. E. Winters

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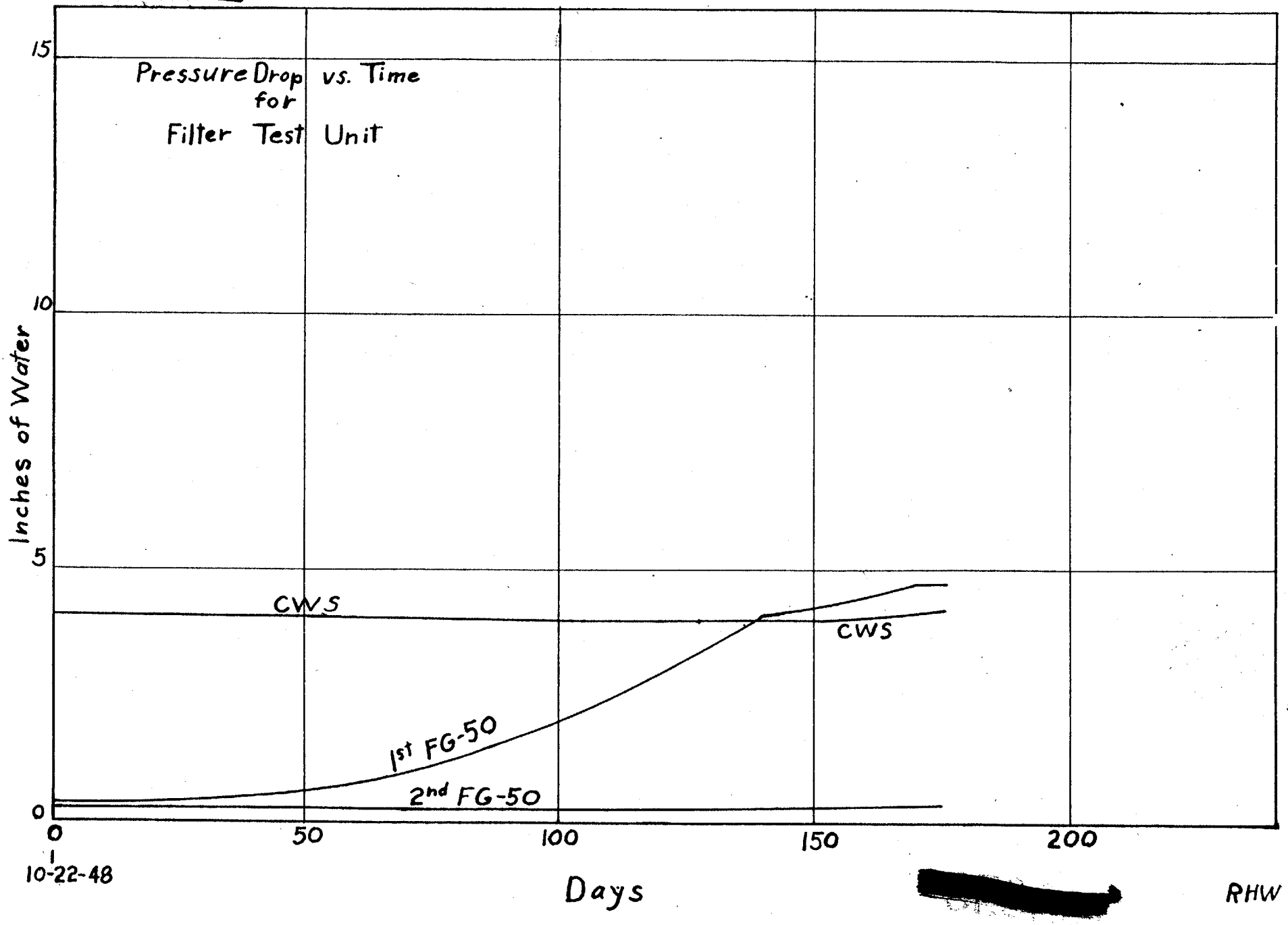

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CENTRAL FILES NUMBER
49-5-222

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Copy # 1A

ISSUED: J. H. Frye

Date: May 15, 1949

Subject: Nineteenth Progress Report on Oak Ridge National Laboratory Waste Disposal

To: C. N. Rucker

From: C. E. Winters

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TRANSMITTAL DATED 5-26-49

To: C. N. Rucker

From: C. E. Winters

Subject: Nineteenth Progress Report on Oak Ridge National Laboratory Waste Disposal

This memorandum summarizes the work accomplished during the past month on the waste disposal work of the Laboratory. The Eighteenth Progress Report was dated April 15, 1949, Central Files No. 49-5-22.

1. Pile Cooling Air

a. Pressure Drop

The pressure drop across the 105 Building Filter House has decreased 0.6" w. g. within the past month compared to a decrease of 0.95" w. g. for the previous month. The decrease during the current month was due to the removal of the two layers of partially plugged F. G. #50 from the filter pockets of cell No. 4 on April 25, 1949, and replacing two layers of F. G. #50 with a layer of F. G. #25 backed up with one layer of F. G. #50. The following table shows current pressure losses:

Location	4-14-49	5-14-49	Change
F. G. #50 Filters	4.7" w. g.	3.3" w. g.	-42%
C. W. S. #6 Filters	1.5" w. g.	1.7" w. g.	+13%
ACROSS FILTER HOUSE	6.8" w. g.	6.2" w. g.	-10%

It is the current plan of the Operations Division to change F. G. filters as necessary, one cell at a time, to hold the overall filter pressure drop to 6 to 8" of water. Their estimate is that four cell changes per year will be required. Since there are four cells in the filter house, an average filter life of one year would result. No realistic estimate of C. W. S. filter life is available.

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b. Slug Rupture

A ruptured slug was located in Metal Channel 1869 during routine visual scanning on May 2, 1949, and discharged without difficulty. The rupture was a Class II slug which had been in the pile seventy days in a temperature zone of approximately 200° C.

c. Filter House Activity

The ionization chambers located directly above the filters in the exhaust air system did not show any appreciable increase in the activity of the material deposited in the Filter House during the month.

d. Pocket Removal - Pile Filter House

An additional FG-50 pocket was removed at the time of the replacement of one-fourth of the filter house FG mounts as referred to in paragraph 1. a. The effective exposure time was approximately 145 days. To date, approximately 40 grams of dust have been physically removed. Analyses are not yet available for estimating the remaining dust burden but will be available for the next report.

In paragraph 1. d of the Eighteenth Progress Report, it was reported that there was approximately 900 grams of uranium dust in the FG-50 filters. A second sample indicates 18 grams for the whole installation, which to our way of thinking is a more reasonable quantity to expect. A third sample is in the laboratory for analysis.

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Three CWS filter paper pockets have been removed from the filter house. The total house activity from Beta measurements (on CWS paper) are listed. The first pocket carried a definite dust burden but to date attempts to determine its weight per unit area have not yielded satisfactory results. The other two pockets showed only a faint gray discoloration.

Removal Date	Time Exposed	Total CWS Activity (β)-Millicuries After 24 hrs*	After 7 days	After 14 days	After 21 days	Apparent half-life
4-25-49	145 days	250	195	165	145	40 days
5-2-49	7 days	50	18	11		**
5-9-49	7 days	48	16			

* Decay was rapid, activity decreasing by about half in the first 24 hours.

** Not yet determined.

f. Life Test - Filter House Type Experiment

The pressure drop across the apparatus referred to in paragraph 1. e in the Eighteenth Progress Report is now 5.2 inches of water. The attached graph summarizes the experience to date.

g. Filter Media Efficiency Test

Further information is available relative to this same test referred to in the last report. The Aerotec Cyclone removed about 38% of the total dust burden but this 38% contained 95% of the total uranium that was removed. The first barrier filter accounted for the remainder.

h. Miscellaneous

The gummed-tape instrument was placed between the F. G. #50 filters and the C. W. S. #6 filters. It was operated for several days and it indicated that some radioactive particulate matter was passing through the F. G. #50 filters.

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Sampling of a Hot Pilot Plant run at 30% Hanford level (data partially reported previously) is summarized in Table I. Total time of the run was 11 days, and it included a double dissolving. The fume line activity

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All three of the Hot Pilot Plant discharges are completely contained in the 205 stack system.

4. Hood Ventilation Air - 706-C Building

Sampling of hot hoods in 706-C has shown these to be a relatively minor contributor to area contamination. Three hood stacks have been sampled:

1) The stack of Hoods Number 1, 2 and 3---Room I
2) The stack of Hoods Number 4 and 5------Rooms I and II
3) The stack of Hood Number 8----------Room V.

The hood nomenclature is that of drawing number TD-782. Samples were taken over periods of three to seven days, starting April 14th, and are still being obtained.

Table II is a summary of pertinent data obtained to date:

Table II

Hood Stack	Maximum Activity Level Mc./hr.	Average Activity Level Mc./hr.
Hoods #1, 2 and 3	0.0041	0.0017
Hoods #4 and 5	0.0035	0.0010
Hood #8	0.00087	0.0004

The sum of the three represent about 0.074 mc. per day of activity.

5. General Plans for Additional Reduction of ORNL Area Air Contamination

a. Hot Suction System

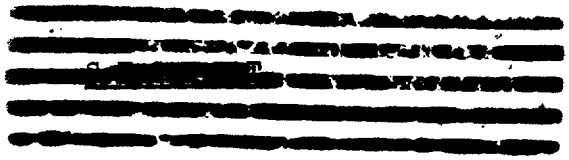
It is planned at the present time to combine into a common header the following lines:

706-D Dissolver Line
706-D Vessel Vent Line
706-C Dissolver and Vessel Vent Lines
New isotope manufacturing area hot suction line
(a combined dissolver and vessel vent line)

From this header the flow would be through a wet Cottrell precipitator followed by a filter, probably of the FG #50 type. Blowers on the exit of the filters would discharge into the base of the new 250 ft. stack. The design capacity of this system will be 2000 cfm at 50" of water vacuum. A decision has not been reached as to the proper means for handling the 205 Building dissolver and vessel vent lines.

b. Cell Ventilation System

The present plans are to combine the ventilating air from the 706-D and 706-C cells and pass through a bank of Trion electrostatic precipitator cells. The air from the precipitator will then flow through a small filter house containing FG #50 and C. W. S. #6 paper into the larger ventilation systems, discharging to the new 250 ft. stack. The design capacity of this system will be about 6000 cfm.



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The hood and cell air from the new radioisotope manufacturing area and the air from the high level hoods in the 706-C Building will be discharged directly into the new 250 ft. stack without treatment until such time as actual measurements on the activity level should disclose a need for air cleaning. The capacity of this system is about 100,000 cfm.

d. Plans and Schedules

It is our belief that the precipitators as proposed above will, after some additional experimental and developmental work, prove that filters are not necessary for this type of service. Until such experimental proof is obtained, the filters as proposed above, will be operated. It will probably not be possible to have the above system operating in its entirety until late 1949 or early 1950. The duct system for b and c above will probably be installed this summer.

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It is our belief that the measurements as reported in this series have indicated that it is possible to design hot chemical operations so that all significant quantities of gaseous activity may be contained into a small volume vent system (Dissolver vent lines and vessel vent lines) and that the larger volume cell ventilation system is essentially devoid of activity. This is demonstrated by the 205 Pilot Plant in which all vessels are essentially tight and are all vented to a tight piping system instead of directly to the cell. Because of this type of design, it would appear that decontamination of the 20,000 cfm of air from the 205 canyon will be unnecessary. The economic advantages of a tight system should be obvious. In the case of Buildings 706-C and 706-D, whose cell equipment is not completely tight, it is desirable to decontaminate the air.

The data to date indicate that jetting and particularly pipette-type sampling operations are a major contributor to cell air contamination. Accordingly, we would recommend avoiding these types of operations wherever possible.

7. Liquid Waste Evaporator

The large-scale liquid waste evaporator has been essentially completed and will be operated during the month of May on cold and tracer level solutions to discover leaks and other operating difficulties. It is expected that by early June, this evaporator will be concentrating, for storage, all of the current liquid chemical waste production.

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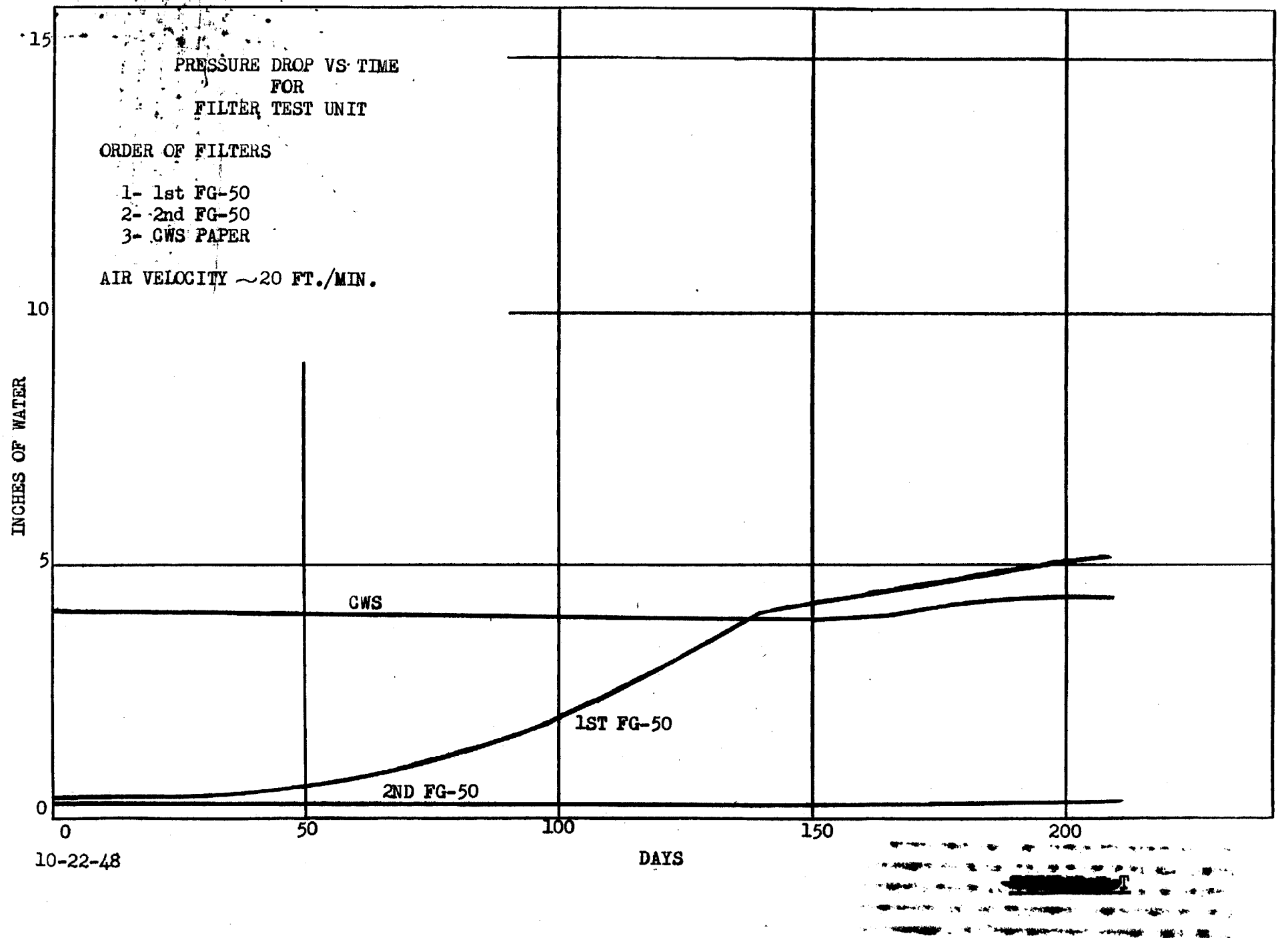
PRESSURE DROP VS TIME
FOR
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ORDER OF FILTERS
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INCHES OF WATER
15
10
5
0
CWS
1ST FG-50
2ND FG-50
0
50
100
150
200
DAYS
10-22-48

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Date May 15, 1949

Subject: Nineteenth Progress Report on Oak Ridge National Laboratory Waste Disposal

To: C. N. Rucker

From: C. E. Winters

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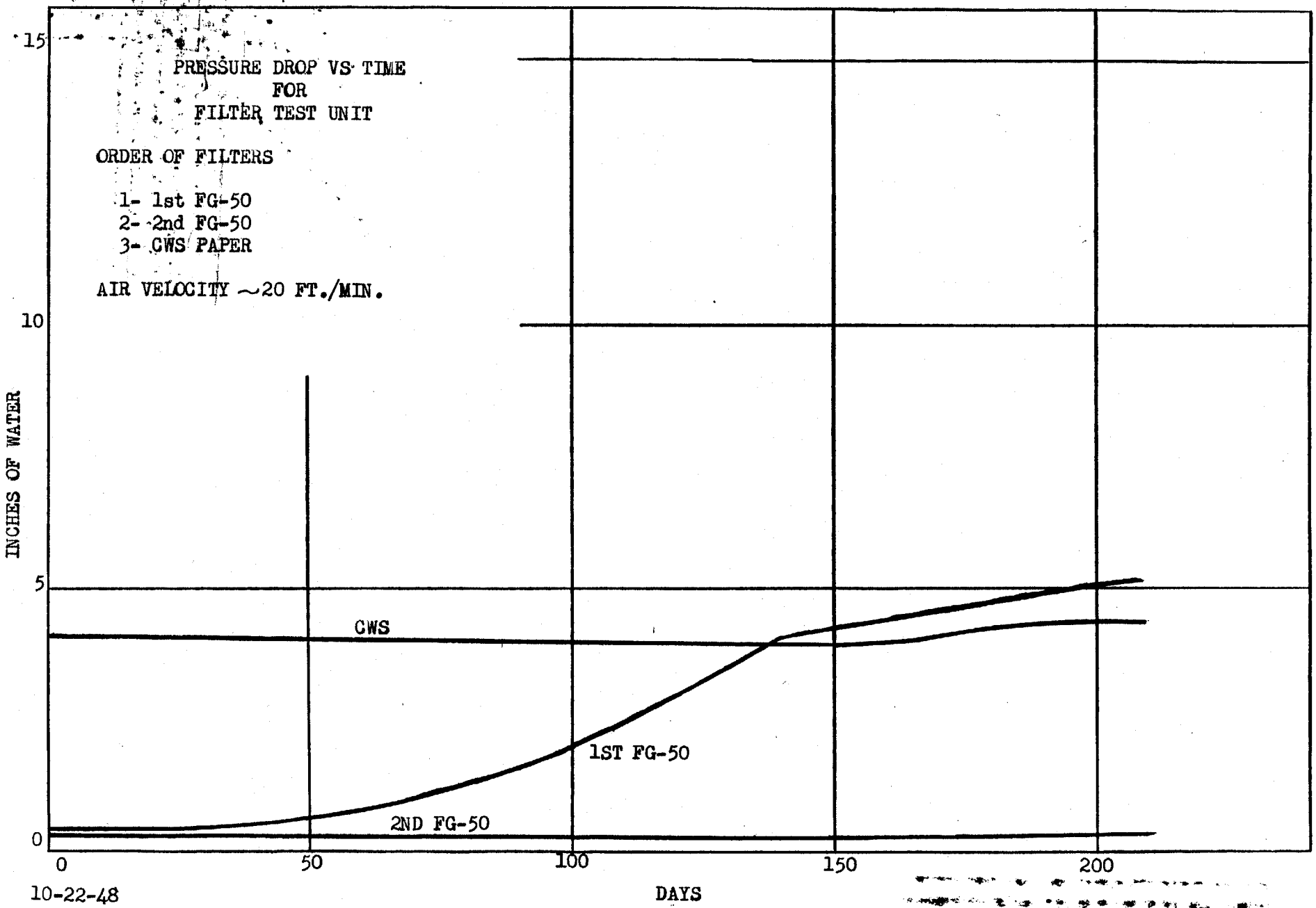
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0
CWS
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2ND FG-50
0
50
100
150
200
DAYS
10-22-48

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Date June 15, 1949

Subject: Twentieth Progress Report on Oak Ridge National Laboratory Waste Disposal

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To: C. N. Rucker

From: C. E. Winters

OAK RIDGE NATIONAL LABORATORY
CENTRAL FILES NUMBER
49-7-31

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RESTRICTED DATA

This document contains restricted data as defined in the Atomic Energy Act of 1946.

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7-7-49

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This memorandum summarizes the work accomplished during the past month on the waste disposal work of the Laboratory. The Nineteenth Progress Report was dated May 15, 1949, Central Files No. 49-5-222.

1. Pile Cooling Air

a. Pressure Drop

The pressure drop across the 105 Building Filter House has increased 0.2" w.g. within the past month compared to a decrease of 0.6" w.g. for the previous month. The following table shows current pressure losses:

Location	(New Filters) 11-14-48	5-14-49	6-14-49	Change
F. G. #50 Filters	1.1" w.g.	3.3" w.g.	3.5" w.g.	+6%
C. W. S. #6 Filters	1.0" w.g.	1.7" w.g.	1.7" w.g.	0
ACROSS FILTER HOUSE	3.3" w.g.	6.2" w.g.	6.4" w.g.	+3%

b. Slug Rupture

A ruptured slug was found in Metal Channel 1467 by use of the scanner on May 31, 1949, and was discharged without difficulty. The thermocouple slug ruptured with the only indication of anything abnormal being an approximate 20° C. crop in thermocouple reading about a week prior to detection of the rupture. Neither the probe nor the sticky tape gave any interpretable indication of a ruptured slug. The slug had been in the pile for 119 days at an approximate temperature of 200° C.

c. Filter House Activity

The ionization chambers located directly above the filters in the exhaust air system did not show any appreciable increase in the activity of the material deposited in the Filter House during the month.

[redacted]

d. Pocket Removal - Pile Filter House

Uranium analyses reveal the total pile filter house uranium content to be about 25 grams. Daily uranium buildup is estimated to be 0.16 grams.

The pocket removed after 156 days total exposure (ca. 145 days effective 100% flow exposure) is estimated to contain on the order of 65 grams of total dust burden.

e. FG Pocket Test

In order to evaluate the relative efficiencies of FG-25 and FG-50 filter material, twenty-two test pockets of FG material were installed in the filter house on 4-26-49. Nine of these have been removed and tested for pressure drop increase and dust pick-up.

Three combinations of FG material are being tested. They are:

1) Two layers of 1"2 inch FG-50
2) Two layers of 1"2 inch FG-25
3) One layer of FG-25 backed by one layer of FG-50

The procedure being followed is to remove three pockets, one of each combination, at two week intervals, measure the pressure drop across each, remove and weigh the filter material.

A longer exposure period and additional samples will be required before any quantitative results can be reported. However, qualitative observations are that for the six-week period no dust has penetrated through to the second layer of FG-50 material in the test pocket containing two layers of 1"2 inch FG-50. There is penetration of dust through to the second layer of the test pockets in which the first layer of filter material is FG-25.

At present there is nothing to indicate that a pocket made up of one layer of FG-25 backed by a layer of FG-50 is not a satisfactory arrangement both from the standpoint of pressure drop and filtering efficiency.

f. CWS Pocket Removal

Continuing decay readings on the pile CWS pockets mentioned in the May 15th Progress Report are included in Table I.

TABLE I

Removal Date	Time Exposed	Total CWS Activity (β)-Millicuries After 24 hrs	After 7 days	After 14 days	After 21 days	Apparent half-life
4-25-49	145 days	250	195	165	145	30 days
5-2-49	7 days	50	18	11	7.5	28 days
5-9-49	7 days	48	16	9	6.5	28 days

Uranium analysis on the 4-25-49 pocket revealed less than one microgram of uranium per sq.in. of CWS. Filter house CWS can contain an upper limit of four grams of uranium, and probably have less than one gram.

g. Life Test, Filter House Duplicate

The pressure drop across the first FG-50 layer is 5.4 inches of water as of June 15, 1949. This represents a rise of 0.2 inches in 30 days.

h. Activity Scanner - Discharge Air

An instrument somewhat similar to the one termed "Junior", that was in service prior to installation of the new Filter House, is being re-evaluated. A sample of pile exhaust air is passed through a cyclone separator, air drawn from the particle collection space of the cyclone, and passed through a CWS #6 filter. The CWS #6 filters are monitored continuously.

"Junior" has been run continuously for about 30 days. The instrument is able to detect power level changes of 100 kw, and has registered higher when irradiated dust was fed into the sampling line.

Since June 6th, operation has been erratic because of the large amounts of uranium swept out of channel 2079 on June 6th and 13th, which have increased pile background. Previously, "Junior" had registered bursts which may have been indicative of a slug rupture.

The charged wire apparatus will be moved to the top of the pile for a more complete evaluation of its worth as an individual metal channel scanning device. Preliminary data indicate that it may be a good channel scanning instrument.

2. Fume Line Sampling - Hot Pilot Plant

Sampling of a 16-day Hot Pilot Plant run at 100% Hanford level is summarized in Table II. All the fume activity, originating in 120-day slugs, is long-lived. The data on the dissolver off-gas line were obtained by Bartholemew, et al (MIT Practice School) during a double dissolving.

TABLE II

	Total Output Millicuries*	Hourly Output Millicuries*
Dissolver Line	2	0.067
Cell Vent Line	15	0.040
Vessel Off-Gas Line	60	0.161
Total	77	0.206

*Expressed as 1 Mev gamma, 1 photon per disintegration

The activity output was only 7.2% of that encountered at a 30% Hanford level. The discrepancy is caused by the 40-day aging of slugs at 30% Hanford level as compared to the 120-day aging at 100% level.

3. Hood Ventilation Air - 706-C Building

Sampling of hot hoods in 706-C has been continued. During the past two months, only minor activity output has been observed from any of the hoods. Simultaneous sampling of building air reveals that nearly all of the hood stack contamination is already present in room air. The order of activity in the air is 10^{-5} millicuries per cu.ft.

4. Summary

A summary of particulate test data to date appears in Table III.

C. E. Winters

CEW:lwb

TABLE III

Summary of Particulate Test Data

Source	CFM	Activity Concentration γ mc/ft^3	Maximum Hourly Output γ mc	Total Output γ mc/month	Comments
Iodine-135 Operations					
Vessel Off-Gas	160	5.0×10^{-2}	1200	7600	Research operation now discontinued. Two runs per month. Mostly short-lived activity. One-day old slugs.
Cell Vent	3780	9.4×10^{-5}	118	340	
Total				7940	
RaLa Operations					
Cell Vent Before Filter	(2440)	(3.7×10^{-5})	(247)	(2710)	One run per month. Higher proportion of long-lived activity. Five-day old slugs.
Cell Vent After Filter	2440	2.3×10^{-6}	4.2	165	
A-16 Line	80	1.1×10^{-3}	293	2700	
A-4 Line	30	2.4×10^{-3}	13.1	422	
Total After Filter				3300	
Redox Operations-Hot Pilot Plant					
30% Hanford Level					
Vessel Off-Gas	130	4.1×10^{-4}	7.0	1682	Operations now discontinued. Two runs per month. Long-lived activity only at 100% level. Discrepancy between 30% and 100% Hanford level is caused by 120-day aging at 100% level, and 40-day aging at 30% level.
Dissolver Off-Gas	10	8.8×10^{-3}	8.0	424	
Cell Vent	20,000	8.5×10^{-8}	0.16	54	
			Total	2160	
100% Hanford Level					
Vessel Off-Gas	110	2.4×10^{-5}	0.483	120	
Dissolver Off-Gas	10	1.1×10^{-4}	0.067	4	
Cell Vent	20,000	3.0×10^{-8}	0.0848	30	
			Total	154	
Pile Air-Before Filter	(100,000)	$(3.6 \times 10^{-8}*)$	(5.0+)	(154*)	*Based on total filter house β and γ activity after 156 days of operation. +Includes short-lived activity, but not active gases.
After Filters				<1	
Iodine-131 Operations					
Cell Vent	4320	1.0×10^{-6}	0.54	75	Weekly runs. One-day old slugs but interior scrubbers are quite effective.
Vessel Off-Gas	175	1.4×10^{-5}	0.49	42	
Total				117	
Hoods-706-C	12,000	4.5×10^{-9}	0.01	2.3	Activity of room air close to hood stack gas activity.

NOTE: The total hood air discharge for ORNL has been estimated to be 215,000 cfm. If all the hoods were as hot as those in 706-C (doubtful), the total area contamination from this source would be 43 mc/month

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This document has been approved for release to the public by
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Technical Information Officer
ORNL Site

Date June 15, 1949

Subject: Twentieth Progress Report on Oak Ridge National Laboratory Waste Disposal

To: C. N. Rucker

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This document consists of 7 pages. No. 22 of 34 copies. Series A.

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